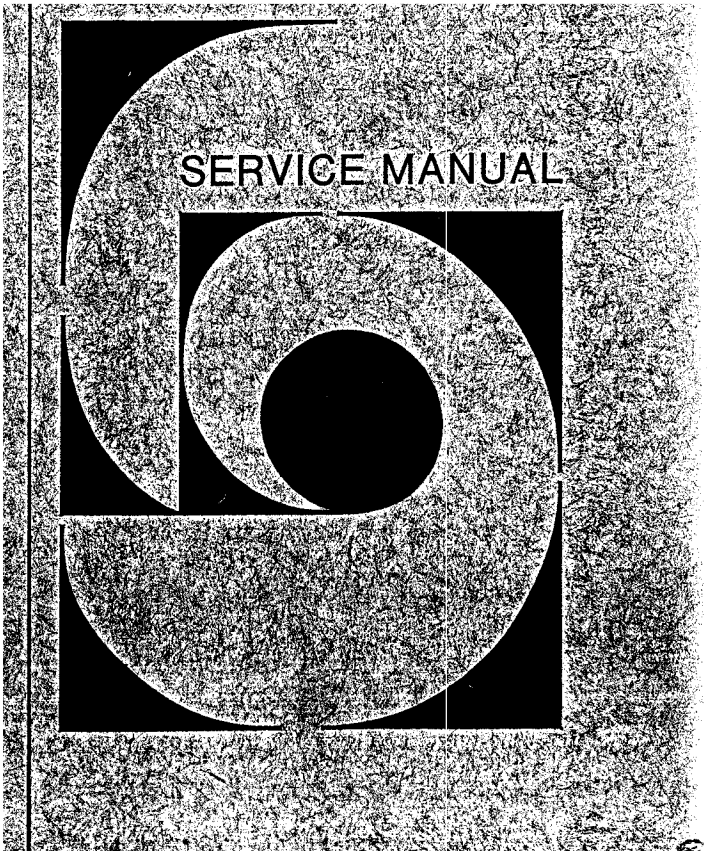
Bang & Olufsen

BEOMASTER 1900

TYPE 2903/4



INTRODUCTION

In the diagrams each component is provided with an individual position number and a co-ordinate designation, e.g. B3. This designation refers to the position on the PC board which is provided with a printed division into spaces and with letters and figures along the edge of the PC board.
For the two amplifier channels the two last digits of the position numbers are identical. Left channel begins with 200, right channel with 300.

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TECHNICAL DATA AMPLIFIER

Power output 1000 Hz RMS	2 x 30 W / 4 Ohms
	2 x 20 W / 8 Ohms
Music power	2 x 50 W / 4 Ohms
	2 x 30 W / 8 Ohms
Speaker impedance	4 Ohms
Harmonic distortion	
1000 Hz, 50 mW	< 0,07%
DIN 45 500, 40 - 12.500 Hz	< 0,13%
Intermodulation DIN 45 500	< 0,15%
Frequency range ± 1,5 dB DIN 45 500	20 - 40.000 Hz
Power bandwidth, 1% distortion	10 - 40.000 Hz
Damping factor 1000 Hz	> 70
Input pick-up	3 mV / 47 KOhms
Input tape	220 mV / 470 KOhms
Signal-to-noise ratio DIN 45 500	
50 mW, pick-up	> 60 dB
50 mW, tape recorder	> 65 dB
Channel separation 1000 Hz, DIN 45 500	> 56 dB
250 - 10.000 Hz	> 38 dB
Output, tape recorder 1000 Hz, DIN 45 500	100 mV / 100 KOhms
Headphones	Max. 6 V / 200 Ohms
Bass control at 40 Hz	± 18 dB
Treble control at 12.500 Hz	± 15 dB

FM

FM range	87,5 - 108 MHz
Sensitivity, stereo 46 dB	< 30 µV / 75 Ohms
Signal-to-noise ratio, stereo, weighted	> 60 dB
Frequency range DIN 45 500, ± 1,5 dB	20 - 15.000 Hz
Harmonic distortion DIN 45 500	< 0,4%
Stereo channel separation 1000 Hz	> 35 dB
Pilot suppression 19 KHz	> 45 dB
38 KHz	> 50 dB

OTHER DATA

Power supply	110 - 130 - 220 - 240 V
Power consumption	25 - 185 W
Dimensions W x H x D	62 x 6 x 25 cm
Weight	7,6 kg

Subject to change without notice

MÅLEBETINGELSER FOR DIAGRAM:

Alle DC spændinger er målt i forhold til stel med voltmeter (indre modstand 11 MOhm).
DC spændinger *uden* parantes er målt med modtageren i stilling FM 5 og antennesignal på 500 µV (1 mV EMK) med pilottone.
VOLUME i stilling MEDIUM og højttalere *ikke* tilsluttet.
DC spændinger *i* parentes på 2IC9 er målt, når et af betjeningsfelterne aktiveres.
DC spændinger *i* parentes på 2TR30, 2TR31 og 2TR32 er målt i stilling STAND BY.
FM signalniveauer er målt ved Δf 40 kHz, f mod. 1 kHz og antennesignal på 500 µV (1 mV EMK).
LF følsomheder er målt ved 30 W output. Balance, bas, diskant på 0, volume på max. Udgang belastet med 4 Ohm, input 1 kHz.

CONDITIONS OF MEASUREMENT FOR DIAGRAM:

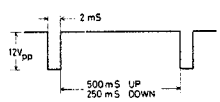
All DC voltages are measured in proportion to chassis with voltmeter (inner resistance 11 MOhm).
DC voltages *without* bracket are measured with the receiver in position FM 5 and aerial signal 500 µV (1 mV EMK) with pilot signal.
Volume in position MEDIUM and speakers *not* connected.
DC voltages *with* brackets on 2IC9 are measured when one of the operating fields is activated.
DC voltages *with* brackets on 2TR30, 2TR31 and 2TR32 are measured in position STAND BY.
FM signal levels are measured at Δf 40 kHz, f mod. 1 kHz and aerial signal 500 µV, (1 mV EMK).
LF sensitivities are measured at 30 W ouput. Balance, bass treble on 0, volume on max.
Output loaded with 4 Ohm, input 1 kHz.

MESSBEDINGUNGEN FÜR SCHALTBILD:

Alle DC Spannungen sind im Verhältnis zu Chassis mit Voltmeter (innerer Widerstand 11 MOhm) gemessen.
DC Spannungen *ohne* Klammern sind mit dem Empfänger in Stellung FM 5 und Antennensignal von 500 µV (1 mV EMK) mit Pilotten gemessen.
Volume in Position MEDIUM und Lautsprecher *nicht* angeschlossen.
DC Spannungen *in* Klammern auf 2IC9 sind gemessen, wenn eines der Bedienungsfelder aktiviert wird.
DC Spannungen *in* Klammern auf 2TR30, 2TR31 und 2TR32 sind in Position STAND BY gemessen.
FM Signalniveaus sind bei Δf 40 kHz, f mod. 1 kHz und Antennensignal von 500 µV (1 mV EMK) gemessen.
LF Empfindlichkeiten sind bei 30 W Output gemessen. Balance, Tiefton, Diskant auf 0, Volume auf max. Ausgang mit 4 Ohm belastet, Eingang 1 kHz.

TESTPUNKTER/TESTPOINTS/ TESTPUNKTE

2TP2	IF signal
2TP3	FM detector adjustment
2TP4	Osc. adjustment (2C24)
	3 V_{pp} square-wave 19 kHz
2TP13	27 V ± 1,5 V
2TP14	— 11,5 V ± 1,5 V
2TP15	15 V ± 0,1 V
2TP16	15,5 V ± 0,3 V
2TP17	15 V in STAND BY, 0 V on program

2TP202	12 mV
2TP302	12 mV
2TP203	0 V ± 200 mV
2TP303	0 V ± 200 mV
3TP1	
3TP2	3,2 V eff. (RMS), 9 V_{pp} approx. 100 kHz
3TP3	7,9 V, volume in MEDIUM
4TP1	Tuning voltage

FM SIGNALNIVEAUER/ FM SIGNAL LEVELS/ UKW SIGNALNIVEAUS

2TP1	9 mV
2TP2	100 mV
2TP3	180 mV, 1 kHz

FØLSOMHEDER/ SENSITIVITIES/ EMPFINDLICHKEITEN

2TP200	150 mV
2TP300	150 mV
2TP201	160 mV
2TP301	160 mV
PHONO	3 mV
TAPE	220 mV

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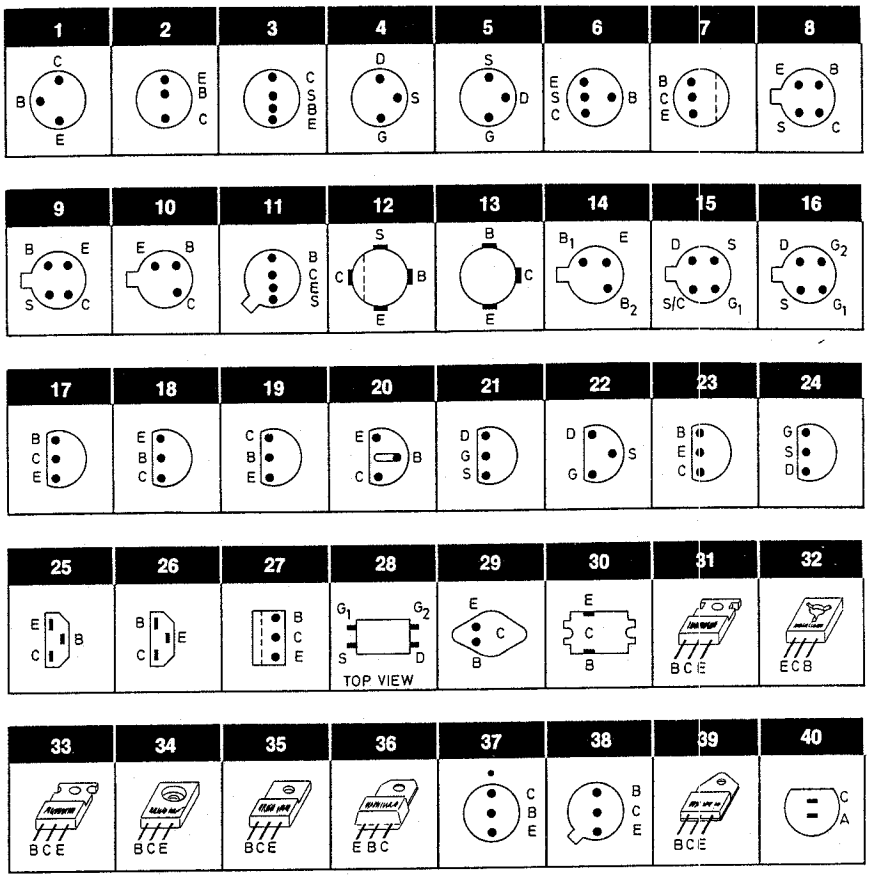
TRANSISTOR AND IC LIST



1TR1	8320119	4	U 1981 E
		21	2N 5245
		21	TIS 88 A
1TR3	8320136	4	U 1981 E
		21	3C2
		21	TIS 88 A
1TR4	8320112	26	BF 195
2TR1	8320311	23	BF 240
2TR2			
2TR14	8320316	20	BC 327
2TR15	8320132	20	BC 548 B
2TR22		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR23	8320104	20	BC 558 B
		20	BC 212 B
		17	BC 212 BL
		20	BC 212 BK
		20	BC 252 B
		18	BC 308 B
2TR24	8320316	20	BC 327
2TR25	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR26	8320161	20	BC 212 B
		20	BC 212 BK
		17	BC 212 BL
		20	BC 251 B
2TR27	8320257	33	TIP 32 A
		34	2N 4919
		34	MJE 2371
2TR28	8320316	20	BC 327
2TR29	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR30	8320104	20	BC 558 B
		20	BC 212 B
		17	BC 212 BL
		20	BC 212 BK
		20	BC 252 B
		18	BC 308 B
2TR31	8320240	32	BD 136
		32	BD 136/W

DIODE LIST

0D1	8310023	B80 C5000/3000
1D1	8300050	BB 103 blue
1D2-1D3	8300041	BB 103 green
1D4	8300032	BA 138
1D5	8300050	BB 103 blue
2D1-2D2	8300131	1N 4148
2D3-2D4	8300142	AA 143
		OA 47
2D5-2D9	8300131	1N 4148
2D14-2D15	8300023	EM 502
		1N 4002
		1N 4003
2D16	8300128	ZPD 5,6V 5%
		BZX 79 5,6V
2D17-2D18	8300023	EM 502
		1N 4002
		1N 4003
2D19	8340081	ZTK 27 ass.
2D20	8300222	ZPD 2,7V 5%
		BZX 83 2,7V
2D21	8300131	1N 4148
2D37	8300131	1N 4148
2D47	8300131	1N 4148
2D48	8300029	ZPD 12V
		BZX 79 12 V
2D49	8300131	1N 4148
2D50	8300247	KB10 B40 C 1500

2D51	8300028	ZPD 9,1V 5%
		BZX 79 9,1V
2D52	8300128	ZPD 5,6V 5%
		BZX 79 5,6V
2D53-2D54	8300131	1N 4148
2D55	8300023	EM 502
		1N 4002
		1N 4003
2D200-2D304	8300131	1N 4148
3D1- 3D11	8300131	1N 4148
3D12	8300222	ZPD 2,7V 5%
		BZX 83 2,7V
3D13	8300131	1N 4148
4D1- 4D5	8300131	1N 4148
5D1	8300195	TIL 209 A
		LED 5074
8D1-8D2	8300023	EM 502
		1N 4003
		1N 4002

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2TR32	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR200/300	8320095	20	BC 549 B
2TR201/301		20	BC 184 B
2TR202/302		17	BC 184 BL
		20	BC 184 BK
2TR203/303	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR204/304	8320221	20	BC 549 C
2TR205/305		20	BC 184 C
		17	BC 184 CL
		20	BC 184 CK
2TR206/306	8320345	24	MPF 111
		21	E 5565
2TR207/307	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR208/308	8320377	20	BC 547 C
2TR209/309		20	BC 182 C
		17	BC 182 CL
		20	BC 182 CK
2TR210/310	8320092	20	BC 182 B
		17	BC 182 BL
		20	BC 182 BK
		20	BC 547 B
		18	BC 237 B
		1	BC 207 B
2TR211/311	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR212/312	8320365	19	MPS H54
2TR213/313	8320321	19	MPS A06
2TR214/314			

2TR215/315	8320132	20	BC 548 B
2TR216/316		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
2TR217/317	8320104	20	BC 558 B
		20	BC 212 B
		17	BC 212 BL
		20	BC 212 BK
		20	BC 252 B
		18	BC 308 B
2IC1	8340071		MC 1355 PQ
2IC2	8340032		MC 1310 PQ
			CA 1310 Q
			LM 1310 Q
2IC3	8340028	19	MPS A13
2IC4		19	SPS 5418
2IC5	8340055		SAS 570 S
2IC6			
2IC9	8340025	20	BC 516
		19	MPS A65
		19	SPS 5431
2IC200/300	8340042	39	TIP 141
2IC201/301	8340041	39	TIP 146
3TR1	8320132	20	BC 548 B
3TR2		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
3TR3	8320104	20	BC 558 B
		20	BC 212 B
		17	BC 212 BL
		20	BC 212 BK
		20	BC 252 B
		18	BC 308 B
3TR4	8320132	20	BC 548 B
		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
3TR5	8320377	20	BC 547 C
		20	BC 182 C
		17	BC 182 CL
		17	BC 182 CK

3TR6	8320104	20	BC 558 B
3TR7		20	BC 212 B
		17	BC 212 BL
		20	BC 212 BK
3TR8	8320161	20	BC 212 B
3TR9		20	BC 212 BK
		17	BC 212 BL
		20	BC 251 B
3TR10	8320132	20	BC 548 B
3TR11		20	BC 172 B
		20	BC 183 B
		17	BC 183 BL
		20	BC 183 BK
3TR12	8320221	20	BC 549 C
		20	BC 184 C
		17	BC 184 CL
		20	BC 184 CK
3TR13	8320104	20	BC 558 B
		20	BC 212 B
		17	BC 212 B
		20	BC 212 BK
3IC1	8340070		MP 14516 CP
4TR200/300	8320069	1	BC 154
		19	BC 322 B
		18	BC 309 B
		20	BC 214 B
		20	BC 559 B
		18	BC 253 B
4TR201/301	8320095	20	BC 549 B
		20	BC 184 B
		17	BC 184 BL
		20	BC 184 BK
5TR1-5TR7	8320201	20	BC 183 B
		20	BC 183 BK
		17	BC 183 BL
		19	MPS 6515
		1	BC 207 B

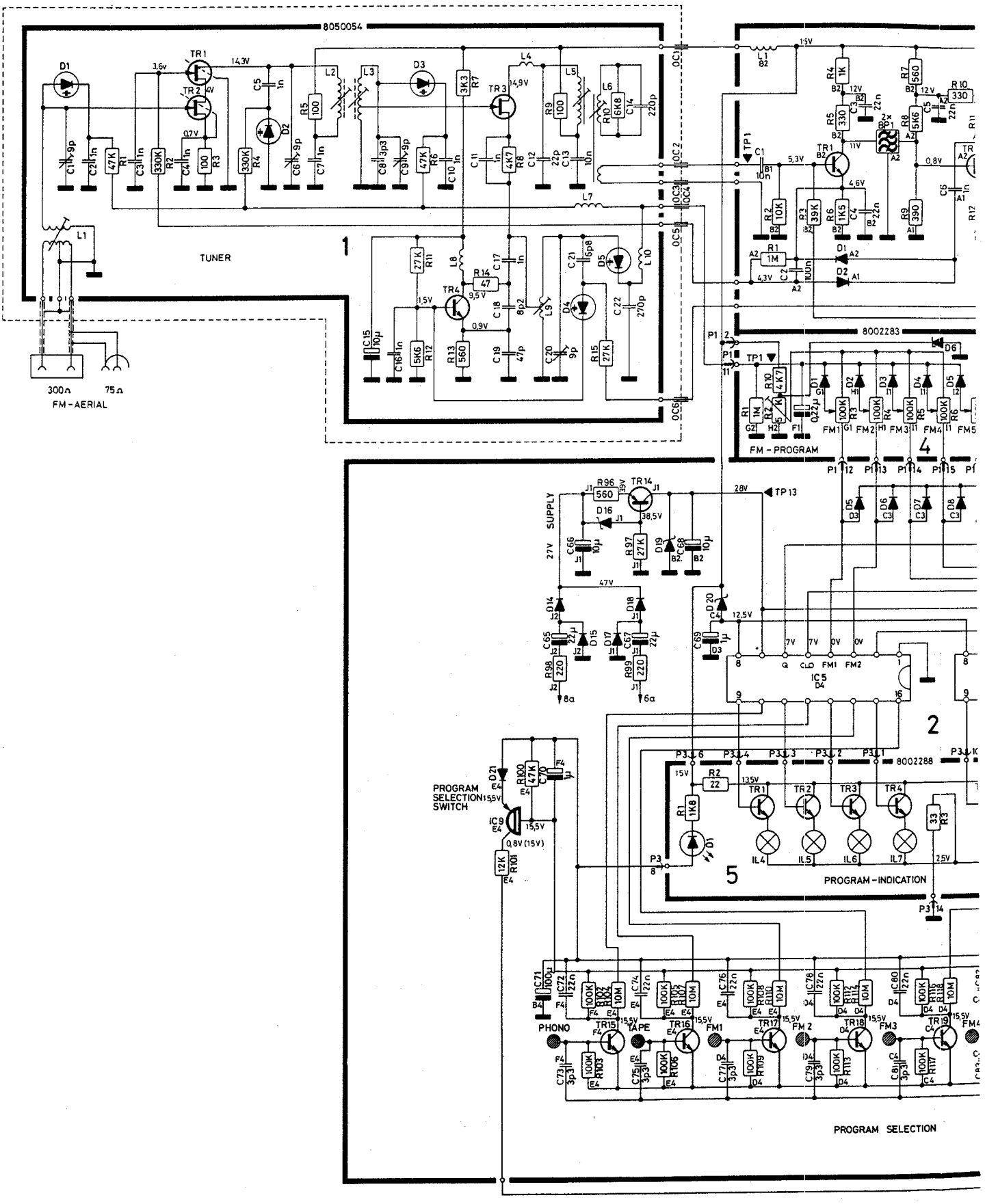
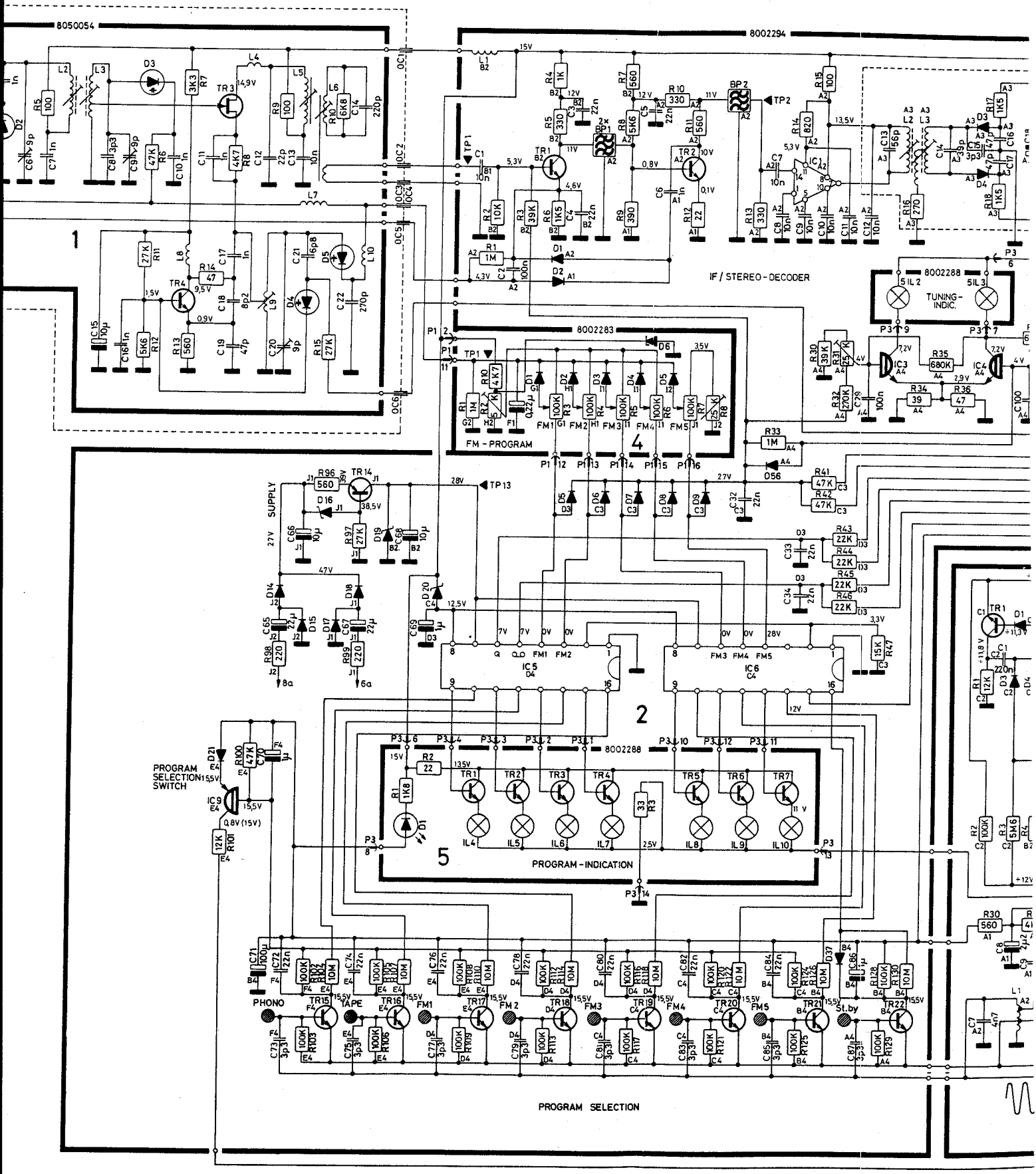
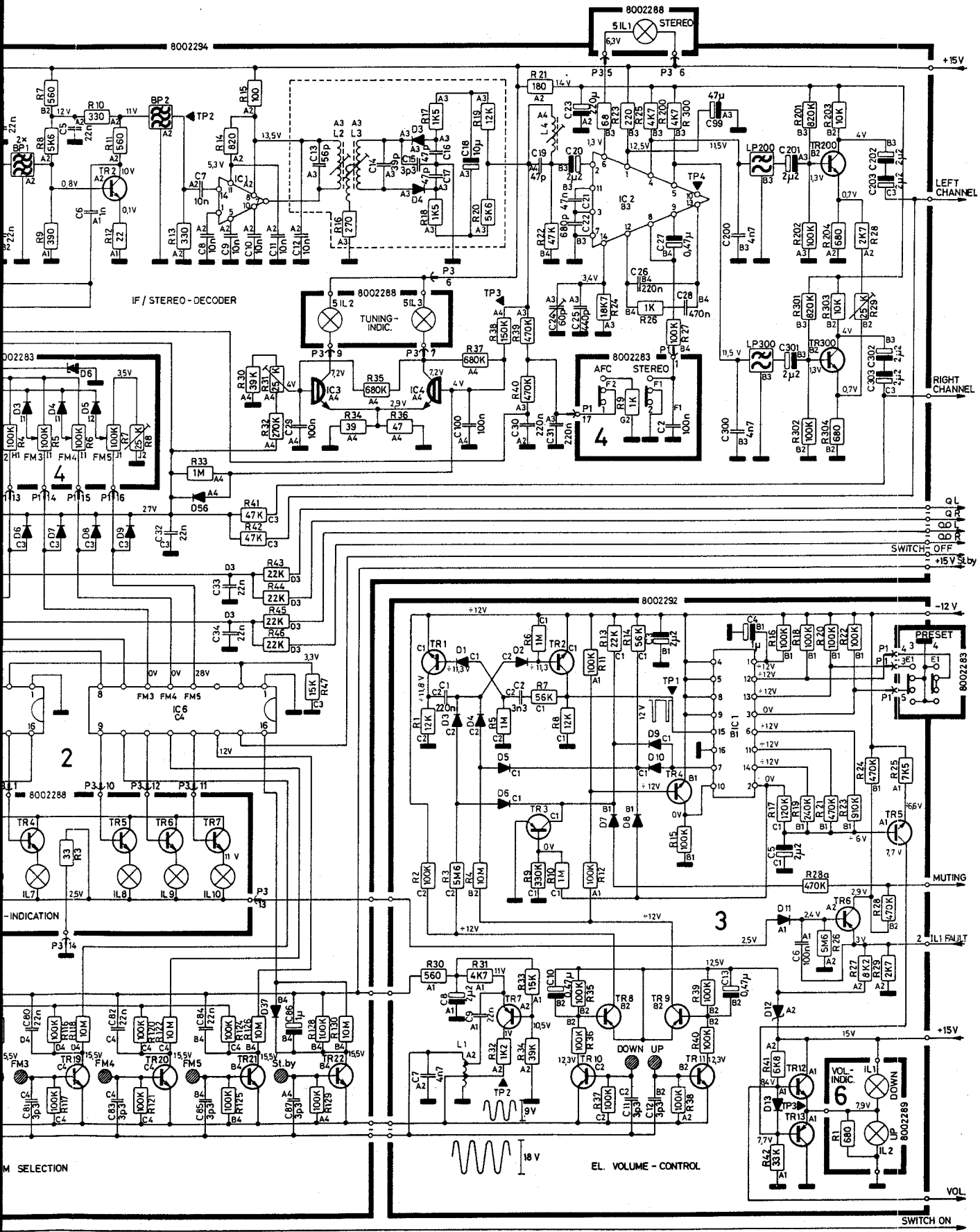

8050054
TUNER
FM-AERIAL
300Ω
75Ω
8002283
FM - PROGRAM
SUPPLY
8002288
PROGRAM SELECTION SWITCH
PROGRAM - INDICATION
PROGRAM SELECTION
PHONO
TAPE
FM1
FM 2
FM3

DIAGRAM 1


8050054
8002294
IF / STEREO-DECODER
8002288
TUNING-INDIC.
8002283
FM - PROGRAM
SUPPLY
PROGRAM SELECTION SWITCH
PROGRAM-INDICATION
PROGRAM SELECTION
PHONO
TAPE
FM1
FM2
FM3
FM4
FM5
St.by
1
2
4
5


8002294
8002288
STEREO
+15V
LEFT CHANNEL
RIGHT CHANNEL
IF / STEREO - DECODER
TUNING - INDIC.
AFC
SWITCH OFF
+15V St.by
8002292
-12 V
PRESET
MUTING
IL1 FAULT
SWITCH ON
VOL.
FM SELECTION
EL. VOLUME - CONTROL
DOWN
UP
VOL. INDIC.
8002289
8002283

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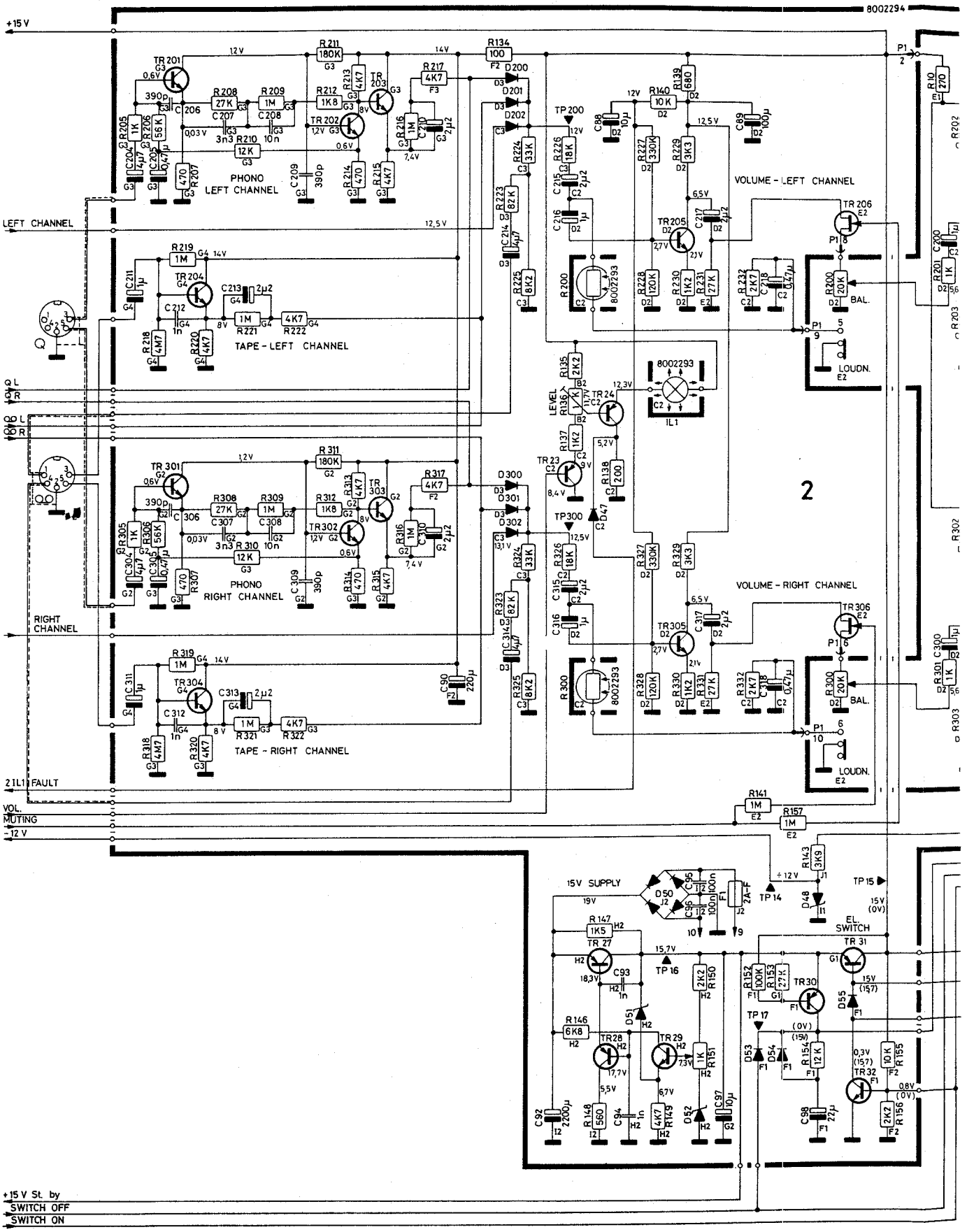
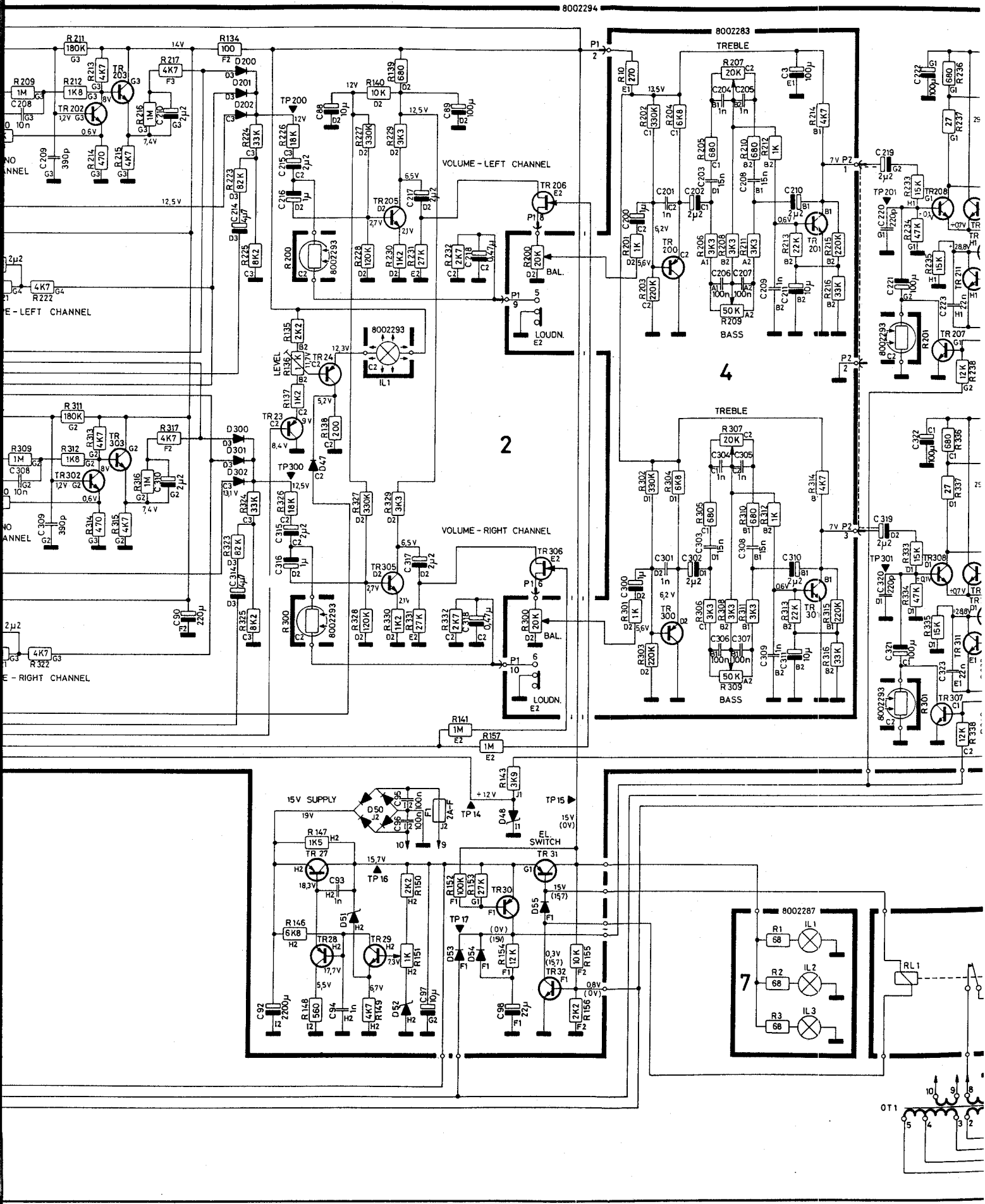
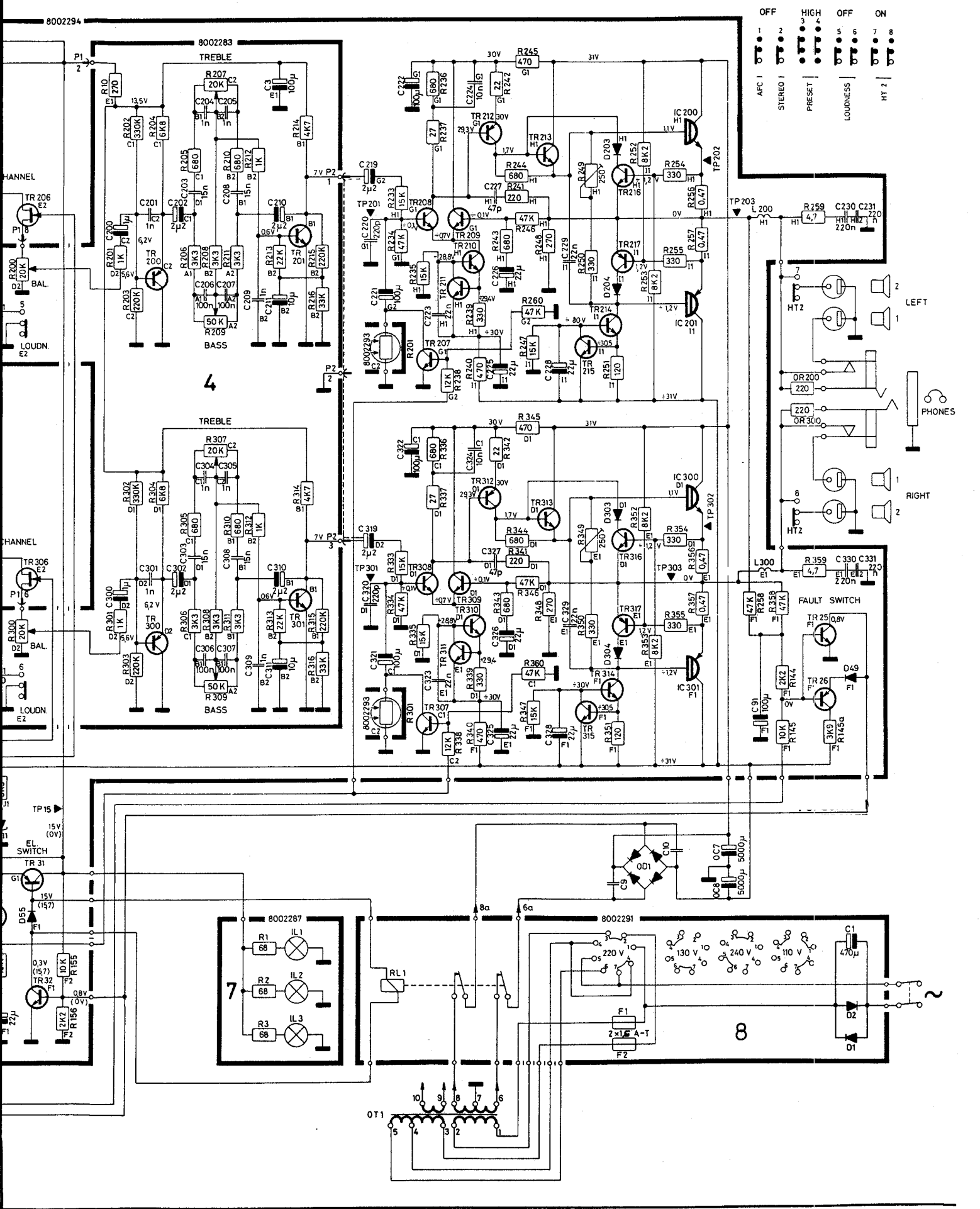
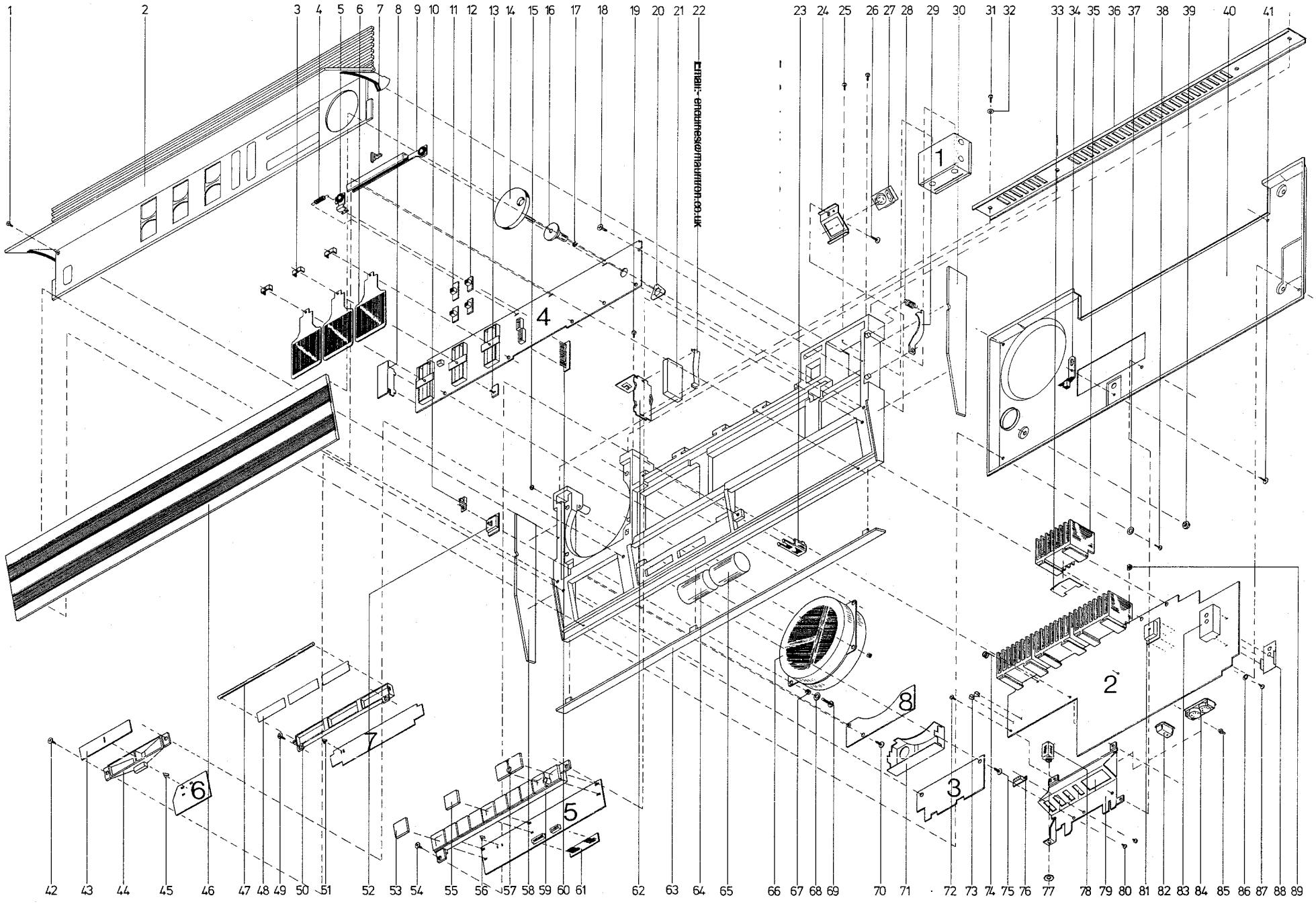


DIAGRAM 2


8002294
8002283
TREBLE
VOLUME - LEFT CHANNEL
VOLUME - RIGHT CHANNEL
BASS
BAL.
LOUDN.
LEVEL
15V SUPPLY
EL. SWITCH
8002287
8002293
8002292
8002293
LEFT CHANNEL
RIGHT CHANNEL
2
4
7


8002294
8002283
TREBLE
BASS
4
8002287
7
8002291
8
OFF
HIGH
OFF
ON
AFC I
STEREO I
PRESET
LOUDNESS
HT 2
LEFT
RIGHT
PHONES
FAULT SWITCH
EL. SWITCH
BAL.
LOUDN.
CHANNEL
RL1
OT1


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89
1
2
3
4
5
6
7
8

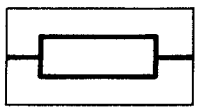
PARTS LIST

1	2039901	Screw AM 3 x 8 DIN 7985, black
2	3458284	Upper part with cover
3	2816122	Bronze spring
4	2810074	Spring
5	2548118	Bracket
6	3370091	Indicator mask
7	3190061	Pointer
8	3302256	Screen
9	2548119	Bracket
10	2775349	Knob, ON-OFF
11	2775351	Knob, PRE-SET VOL
12	2775350	Knob, STEREO/LOUD-NESS AFC
13	7220105	Plug, 3 pins
14	2794061	Wheel
15	2380016	Nut M4
16	2905066	Bearing
17	2390004	Locking ring UG 3 x 0.6
18	2015910	Screw 3.5 x 9.52
19	2039010	Screw AM 3 x 6 DIN 7985, black
20	2395035	Lock disc
21	8310023	Rectifier
22	2816121	Bronce spring
23	3152188	Attachment for mains lead
24	2548114	Bracket
25	2039901	Screw AM 3 x 8 DIN 7985, black
26	2015910	Screw 3.5 x 9.52
27	7210089	Socket 240/60 ohms
28	2810075	Spring
29	3011006	Friction arm
30	3412211	Cabinet, teak, 3 parts
	3412213	Cabinet, rosewood, 3 parts
	3412214	Cabinet, oak, 3 parts
	3412215	Cabinet, white, 3 parts
31	2039010	Screw AM 3 x 6 DIN 7985, black
32	2622252	Washer 3.2 black
33	2816120	Spring
34	2854046	Arm
35	2568220	Heat sink
36	3452227	Back plate
37	2622252	Washer 3.2 black
38	2039010	Screw AM 3 x 6 DIN 7985, black
39	3035026	Plastic foot
40	3454211	Bottom plate
41	2013076	Screw 2.84 x 4.76 black
42	2015910	Screw 3.5 x 9.52
43	3370092	Window, red
44	3131105	Housing
45	2510117	Clamp
46	3168075	Front panel
	2816119	Contact spring
47	3370097	Magnifying rod
48	3370093	Window, red
49	2015910	Screw 3.5 x 9.52
50	3131106	Housing
51	2510117	Clamp
52	7450023	Mains switch
53	3370094	Window, green
54	2015910	Screw 3.5 x 9.52
55	3370095	Window, red
56	2510117	Clamp
57	3370096	Windows, 2 parts, green
58	3412211	Cabinet, teak, 3 parts
	3412213	Cabinet, rosewood, 3 parts
	3412214	Cabinet, oak, 3 parts
	3412215	Cabinet, white, 3 parts
59	3131107	Housing
60	7220106	Plug, 18 pins
61	7220110	Plug, 14 pins
62	2542409	Bracket
63	3412211	Cabinet, teak, 3 parts
34	3412213	Cabinet, rosewood, 3 parts
	3412214	Cabinet, oak, 3 parts
	3412215	Cabinet, white, 3 parts
64	4200305	5000 µF 35 V
65	4200305	5000 µF 35 V
66	8013145	Mains transformer
67	2938125	Rubber bushing
68	2622024	Washer 4.3
69	2043900	Screw AM 4 x 20 DIN 7985
70	2015907	Screw 3.5 x 12.7
71	3172068	Cover
72	2013076	Screw 2.84 x 4.76
73	7500002	Fuse holder
74	3358113	Cooling coil
75	2015910	Screw 3.5 x 9.52
76	7400102	Speaker switch
77	2380092	Nut
78	7210023	Jack-socket
79	2548113	Chassis
80	2034231	Screw AM 2 x 4 DIN 84
81	8002293	PC-board, Volume control
82	7211047	Socket 2 pol.
83	3304052	Screen, housing
84	7210088	Socket 2 x 5 pol.
85	2992059	Pin
86	2622052	Fibre washer
87	2013202	Screw 2.9 x 9.52 DIN 7981
88	3302248	Screen
89	2992042	Spacer

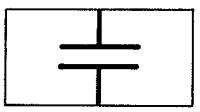
NOT SHOWN PARTS

3152195	Aerial holder
3391461	Outer carton
3391462	Top/bottom insert
3397249	Foam packing, left
3397250	Foam packing, right
3532115	Instruction diagram
2622248	Mica sheet for 2 TR27
2625002	Tooth-lock washer 3.2
2816119	Contact spring, sensitouch
6271048	Mains lead with euro-plug
7500014	Contact bushing
7500013	Contact spear
3170041	Insulating bead for 2R98 and 2 R99
3984005	Lubricant for friction arms ROCOL kilopoise 0868

ELECTRIC PARTS LIST

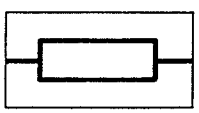


0R200	5001019	220 Ohms 10% 1/2W
0R300	5001019	220 Ohms 10% 1/2W

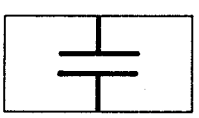


0C1	4010018	1 nF 250V
0C2	4010018	1 nF 250V
0C3	4010018	1 nF 250V
0C4	4010018	1 nF 250V
0C5	4010018	1 nF 250V
0C6	4010018	1 nF 250V
0C7	4200305	5000 µF 35V
0C8	4200305	5000 µF 35V

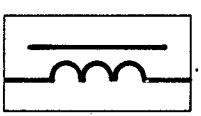
1 PC 8050054 FRONT END



R1	5001050	47 Kohms 10% 1/2W	R9	5001013	100 Ohms 10% 1/2W
R2	5001062	330 Kohms 10% 1/2W	R10	5001040	6,8 KOhms 10% 1/2W
R3	5001013	100 Ohms 10% 1/2W	R11	5010141	27 KOhms 5% 1/8W
R4	5001062	330 KOhms 10% 1/2W	R12	5010041	5,6 KOhms 5% 1/8W
R5	5001013	100Ohms 10% 1/2W	R13	5010067	560 Ohms 5% 1/8W
R6	5001050	47 Kohms 10% 1/2W	R14	5010411	47 Ohms 5% 1/8W
R7	5010076	3,3 KOhms 5% 1/8W	R15	5001047	27 KOhms 10% 1/2W
R8	5001038	4,7 KOhms 10% 1/2W			

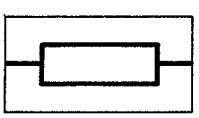


C1	4330001	1 - 9 pF Cer.	C13	4130081	10 nF 20% 250V
C2	4010008	1 nF —20 +50% 400V	C14	4101007	220 pF 5% 63V
C3	4010008	1 nF —20 +50% 400V	C15	4200107	10 µF 10V
C4	4010008	1 nF —20 +50% 400V	C16	4010008	1 nF —20 +50% 400V
C5	4010008	1 nF —20 +50% 400V	C17	4010008	1 nF —20 +50% 400V
C6	4330001	1 - 9 pF Cer.	C18	4000015	8,2 pF 0,25 pF 63V
C7	4010008	1 nF —20 +50% 400V	C19	4003130	47 pF 2% 63V
C8	4003012	3,3 pF 0,25 pF 400V	C20	4330001	1 - 9 pF Cer.
C9	4330001	1 - 9 pF Cer.	C21	4005004	6,8 pF 0,5 pF 400V
C10	4010008	1 nF —20 +50% 400V	C22	4101031	270 pF 5% 63V
C11	4010008	1 nF —20% +50% 400V			
C12	4003059	22 pF 5% 250V			

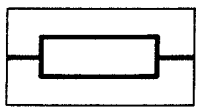


L1	8020120	RF-coil	L8	6830052	3,8 µH 5%
L2	8020121	RF-coil, prim.	L9	8020183	Osc.
L3	8020122	RF-coil, sec.	L10	6830052	3,8 µH 5%
L4	6710001	Ferrit-tube		6702001	Ferritcore F 100 (r)
L5	8020124	10,7 Mhz		6702008	Ferritcore F 10 (wh)
L6	8020137	10,7 MHz		6479001	Glassbushing
L7	6830052	3,8 µH 5%			

2 PC 8002294 IF-DECODER-PROGRAM SELECTION-AF AMPLIFIER

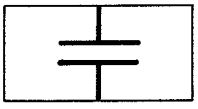


R1	5010054	1 MOhms 5% 1/8W	R33	5010054	1 MOhms 5% 1/8W
R2	5010059	10 KOhms 5% 1/8W	R34	5010622	39 Ohms 5% 1/8W
R3	5010060	39 KOhms 5% 1/8W	R35	5010074	680 KOhms 5% 1/8W
R4	5010040	1 KOhms 5% 1/8W	R36	5010411	470 Ohms 5% 1/8W
R5	5010044	330 Ohms 5% 1/8W	R37	5010074	680 KOhms 5% 1/8W
R6	5010247	1,5 KOhms 5% 1/8W	R38	5010063	150 KOhms 5% 1/8W
R7	5010067	560 Ohms 5% 1/8W	R39	5010077	470 KOhms 5% 1/8W
R8	5010041	5,6 KOhms 5% 1/8W	R40	5010077	470 KOhms 5% 1/8W
R9	5010070	390 Ohms 5% 1/8W	R41	5010045	47 KOhms 5% 1/8W
R10	5010044	330 Ohms 5% 1/8W	R42	5010045	47 KOhms 5% 1/8W
R11	5010067	560 Ohms 5% 1/8W	R43	5010079	22 KOhms 5% 1/8W
R12	5010448	22 Ohms 5% 1/8W	R44	5010079	22 KOhms 5% 1/8W
R13	5010044	330 Ohms 5% 1/8W	R45	5010079	22 KOhms 5% 1/8W
R14	5010068	820 Ohms 5% 1/8W	R46	5010079	22 KOhms 5% 1/8W
R15	5010065	100 Ohms 5% 1/8W	R47	5010053	15 KOhms 5% 1/8W
R16	5010000	270 Ohms 5% 1/8W	R96	5010067	560 Ohms 5% 1/8W
R17	5010247	1,5 KOhms 5% 1/8W	R97	5010141	27 KOhms 5% 1/8W
R18	5010247	1,5 KOhms 5% 1/8W	R98	5001019	220 Ohms 10% 1/2W
R19	5010046	12 KOhms 5% 1/8W	R99	5001019	220 Ohms 10% 1/2W
R20	5010041	5,6 KOhms 5% 1/8W	R100	5010045	47 KOhms 5% 1/8W
R21	5001017	180 Ohms 10% 1/2W	R101	5010046	12 KOhms 5% 1/8W
R22	5010045	47 KOhms 5% 1/8W	R102	5010049	100 KOhms 5% 1/8W
R23	5001010	68 Ohms 10% 1/2W	R103	5010049	100 KOhms 5% 1/8W
R24	5020034	18,7 KOhms 1% 1/8W	R104	5010638	10 MOhms 10% 1/8W
R25	5010092	220 Ohms 5% 1/8W	R105	5010049	100 KOhms 5% 1/8W
R26	5010040	1 KOhms 5% 1/8W	R106	5010049	100 KOhms 5% 1/8W
R27	5010049	100 KOhms 5% 1/8W	R107	5010638	10 MOhms 10% 1/8W
R28	5010298	2,7 KOhms 5% 1/8W	R108	5010049	100 KOhms 5% 1/8W
R29	5370068	25 KOhms 20% LIN.	R109	5010049	100 KOhms 5% 1/8W
R30	5010060	39 KOhms 5% 1/8W	R110	5010638	10 MOhms 10% 1/8W
R31	5370068	25 KOhms 20% LIN.	R112	5010049	100 KOhms 5% 1/8W
R32	5010083	270 KOhms 5% 1/8W	R113	5010049	100 KOhms 5% 1/8W

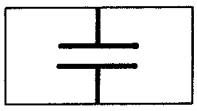


R114	5010638	10 MOhms 10% 1/8W
R115	5010049	100 KOhms 5% 1/8W
R117	5010049	100 KOhms 5% 1/8W
R118	5010638	10 MOhms 10% 1/8W
R120	5010049	100 KOhms 5% 1/8W
R121	5010049	100 KOhms 5% 1/8W
R122	5010638	10 MOhms 10% 1/8W
R124	5010049	100 KOhms 5% 1/8W
R125	5010049	100 KOhms 5% 1/8W
R126	5010638	10 MOhms 10% 1/8W
R128	5010049	100 KOhms 5% 1/8W
R129	5010049	100 KOhms 5% 1/8W
R130	5010638	10 MOhms 10% 1/8W
R134	5001013	100 Ohms 10% 1/2W
R135	5010064	2,2 KOhms 5% 1/8W
R136	5370050	1 KOhms 20% LIN.
R137	5010153	1,2 KOhms 5% 1/8W
R138	5010739	200 Ohms 5% 1/4W
R138	5001017	180 Ohms 10% 1/2W
R139	5010144	680 Ohms 5% 1/8W
R140	5010059	10 KOhms 5% 1/8W
R141	5010054	1 MOhms 5% 1/8W
R143	5010069	3,9 KOhms 5% 1/8W
R144	5010064	2,2 KOhms 5% 1/8W
R145	5010059	10 KOhms 5% 1/8W
R145a	5010069	3,9 KOhms 5% 1/8W
R146	5010052	6,8 KOhms 5% 1/8W
R147	5010247	1,5 KOhms 5% 1/8W
R148	5001025	560 Ohms 10% 1/2W
R149	5010048	4,7 KOhms 5% 1/8W
R150	5010064	2,2 KOhms 5% 1/8W
R151	5370050	1 KOhms 20% LIN.
R152	5010049	100 KOhms 5% 1/8W
R153	5010141	27 KOhms 5% 1/8W
R154	5010046	12 KOhms 5% 1/8W
R155	5010059	10 KOhms 5% 1/8W
R156	5010064	2,2 KOhms 5% 1/8W
R157	5010054	1 MOhms 5% 1/8W
R200	5010048	4,7 KOhms 5% 1/8W
R201	5010505	820 KOhms 5% 1/8W
R202	5010049	100 KOhms 5% 1/8W
R203	5010059	10 KOhms 5% 1/8W
R204	5010144	680 Ohms 5% 1/8W
R205	5010040	1 KOhms 5% 1/8W
R206	5010061	56 KOhms 5% 1/8W
R207	5010058	470 Ohms 5% 1/8W
R208	5010141	27 KOhms 5% 1/8W
R209	5010054	1 MOhms 5% 1/8W
R210	5010046	12 KOhms 5% 1/8W
R211	5010072	180 KOhms 5% 1/8W
R212	5010066	1,8 KOhms 5% 1/8W
R213	5010048	4,7 KOhms 5% 1/8W
R214	5010058	470 Ohms 5% 1/8W
R215	5010048	4,7 KOhms 5% 1/8W
R216	5010054	1 MOhms 5% 1/8W
R217	5010048	4,7 KOhms 5% 1/8W
R218	5011078	4,7 MOhms 10% 1/4W
R219	5010054	1 MOhms 5% 1/8W
R220	5010048	4,7 KOhms 5% 1/8W
R221	5010054	1 MOhms 5% 1/8W
R222	5010048	4,7 KOhms 5% 1/8W
R223	5010091	82 KOhms 5% 1/8W
R224	5010075	33 KOhms 5% 1/8W
R225	5010154	8,2 KOhms 5% 1/8W
R226	5010135	18 KOhms 5% 1/8W
R227	5010117	330 KOhms 5% 1/8W
R228	5010047	120 KOhms 5% 1/8W
R229	5010076	3,3 KOhms 5% 1/8W
R230	5010153	1,2 KOhms 5% 1/8W
R231	5010141	27 KOhms 5% 1/8W
R232	5010298	2,7 KOhms 5% 1/8W
R233	5010053	15 KOhms 5% 1/8W
R234	5010045	47 KOhms 5% 1/8W
R235	5010053	15 KOhms 5% 1/8W
R236	5010144	680 Ohms 5% 1/8W
R237	5010403	27 Ohms 5% 1/8W
R238	5010046	12 KOhms 5% 1/8W
R239	5010044	330 Ohms 5% 1/8W
R240	5010058	470 Ohms 5% 1/8W
R241	5010092	220 Ohms 5% 1/8W
R242	5010448	22 Ohms 5% 1/8W
R243	5010144	680 Ohms 5% 1/8W
R244	5010144	680 Ohms 5% 1/8W
R245	5010058	470 Ohms 5% 1/8W
R246	5010045	47 KOhms 5% 1/8W
R247	5010053	15 KOhms 5% 1/8W
R248	5001020	270 Ohms 10% 1/2W
R249	5370174	250 Ohms 20% LIN.
R250	5010044	330 Ohms 5% 1/8W
R251	5010128	120 Ohms 5% 1/8W
R252	5010154	8,2 KOhms 5% 1/8W
R253	5010154	8,2 KOhms 5% 1/8W
R254	5010044	330 Ohms 5% 1/8W
R255	5010044	330 Ohms 5% 1/8W
R256	5100203	0,47 Ohms 10% 2W
R257	5100203	0,47 Ohms 10% 2W
R258	5010045	47 KOhms 5% 1/8W
R259	5000085	4,7 Ohms 10% 1/2W
R260	5010045	47 KOhms 5% 1/8W

R300- R360 (right channel) =
R200 - R260 (left channel)

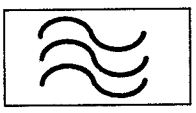


C1	4010041	10 nF —20 +100% 40V
C2	4130107	100 nF 10% 250V
C3	4010060	22 nF —20 +100% 40V
C4	4010060	22 nF —20 + 100% 40V
C5	4010060	22 nF —20 +100% 40V
C6	4010027	1 nF 10% 100V
C7	4010041	10 nF —20 +100% 40V
C8	4010041	10 nF —20 +100% 40V
C9	4010041	10 nF —20 +100% 40V
C10	4010041	10 nF —20 +100% 40V
C11	4010041	10 nF —20 +100% 40V
C12	4010041	10 nF —20 +100% 40V
C13	4003124	56 pF 2% 63V
C14	4003135	39 pF 5% 63V
C15	4000035	3,3 pF 0,25 pF 63V
C16	4003130	47 pF 2% 63V
C17	4003130	47 pF 2% 63V
C18	4201065	10 µF 63V
C19	4003130	47 pF 2% 63V
C20	4200296	2,2 µF 63V
C21	4130087	47 nF 10% 250V
C22	4010031	680 pF 10% 100V
C23	4200097	220 µF 16V
C24	4340003	60 pF Foil
C25	4100044	440 pF 1%63
C26	4130104	220 nF 20% 100V
C27	4201058	0,47 µF 35V
C28	4130114	470 nF 10% 100V
C29	4130107	100 nF 10% 250V
C30	4130104	220 nF 20% 100V
C31	4130104	220 nF 20% 100V
C32	4010060	22 nF —20 +100% 40V
C33	4010060	22 nF —20 +100% 40V
C34	4010060	22 nF —20 +100% 40V
C65	4200100	22 µF 40V
C66	4201065	10 µF 63V
C67	4200100	22 µF 40V
C68	4201065	10 µF 63V
C69	4200298	1 µF 63V
C70	4200298	1 µF 63V
C71	4200099	100 µF 16V
C72	4010060	22 nF —20 +100% 40V
C73	4000035	3,5 pF 0,25 pF 63V
C74	4010060	22 nF —20 +100% 40V
C75	4000035	3,3 pF 0,25 pF 63V
C76	4010060	22 nF —20 +100% 40V
C77	4000035	3,3 pF 0.25 pF 63V
C78	4010060	22 nF —20 +100% 40V
C79	4000035	3,3 pF 0,25 pF 63V
C80	4010060	22 nF —20 +100% 40V
C81	4000035	3,3 pF 0,25 pF 63V
C82	4010060	22 nF —20 +100% 40V
C83	4000035	3,3 pF 0,25 pF 63V
C84	4010060	22 nF —20 +100% 40V
C85	4000035	3,3 pF 0,25 pF 63V
C86	4201057	1 µF 35V
C87	4000035	3,3 pF 0,25 pF 63V
C88	4201065	10 µF 63V
C89	4200099	100 µF 16V
C91	4200098	100 µF 6,3V
C92	4200332	2200 µF 25V
C93	4010027	1 nF 10% 100V
C94	4010027	1 nF 10% 100V
C95	4130107	100 nF 10% 250V
C96	4130107	100 nF 10% 250V
C97	4201065	10 µF 63V
C98	4200100	22 µF 40V
C99	4200092	47 µF 16V

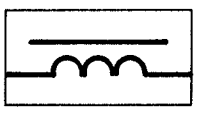


C100	4130107	100 nF 10% 250V
C200	4100059	4,7 nF 2,5% 63V
C201	4200296	2,2 µF 63V
C202	4200296	2,2 µF 63V
C203	4200296	2,2 µF 63V
C204	4201061	4,7 µF 63V
C205	4201058	0,47 µF 35V
C206	4010037	390 pF 10% 100V
C207	4100058	3,3 nF 2,5% 63V
C208	4130109	10 nF 10% 250V
C209	4010037	390 pF 10% 100V
C210	4200296	2,2 µF 63V
C211	4200298	1 µF 63V
C212	4010027	1 nF 10% 100V
C213	4200296	2,2 µF 63V
C214	4201061	4,7 µF 63V
C215	4200296	2,2 µF 63V
C216	4200298	1 µF 63V
C217	4200296	2,2 µF 63V
C218	4201058	0,47 µF 35V
C219	4200296	2,2 µF 63V
C220	4010021	220 pF 10% 100V
C221	4200098	100 µF 6,3V
C222	4201060	100 µF 40V
C223	4010060	22 nF —20 +100% 40V
C224	4130109	10 nF 10% 250V
C225	4200100	22 µF 40V
C226	4200100	22 µF 40V
C227	4003130	47 pF 2% 63 V
C228	4200100	22 µF 40V
C229	4010060	22 nF —20 +100% 40V
C230	4130104	220 nF 20% 100V
C231	4130104	220 nF 20% 100V

C300 - C331 (right channel) =
C200 - C231 (left channel)

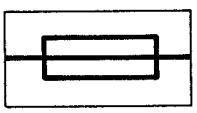


BP1	8030001	10,7 MHz
BP2	8030001	10,7 MHz
LP200	8030008	19/38 KHz
LP300	8030008	19/38 KHz



For Service Manuals Contact

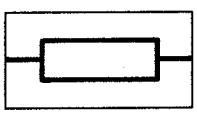
L1	6830052	3,8 µH 5%
L2	8020278	10,7 MHz
L3	8020277	10,7 MHz
L4	8022066	114 KHz
L200	6850114	0,5 µH
L300	6850114	0,5 µH
	6702042	Ferritcore F100 (L2 and L3)



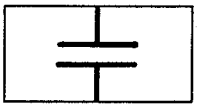
F1	6604024	2A 250V-F
	7500002	Fuse holder

	0593070	Solder lug
	7500014	Socket for pin
	7500013	Contact pin

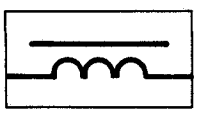
3 PC 8002292 EL-VOLUME CONTROL



R1	5010046	12 KOhms 5% 1/8W
R2	5010049	100 KOhms 5% 1/8W
R3	5010638	10 MOhms 10% 1/8W
R4	5010638	10 MOhms 10% 1/8W
R5	5010054	1 MOhms 5% 1/8W
R6	5010054	1 MOhms 5% 1/8W
R7	5010061	56 KOhms 5% 1/8W
R8	5010046	12 KOhms 5% 1/8W
R9	5010117	330 KOhms 5% 1/8W
R10	5010054	1 MOhms 5% 1/8W
R11	5010049	100 KOhms 5% 1/8W
R12	5010049	100 KOhms 5% 1/8W
R13	5010079	22 KOhms 5% 1/8W
R14	5010061	56 KOhms 5% 1/8W
R15	5010049	100 KOhms 5% 1/8W
R16	5010049	100 KOhms 5% 1/8W
R17	5010047	120 KOhms 5% 1/8W
R18	5010049	100 KOhms 5% 1/8W
R19	5010652	240 KOhms 5% 1/8W
R20	5010049	100 KOhms 5% 1/8W
R21	5010077	470 KOhms 5% 1/8W
R22	5010049	100 KOhms 5% 1/8W
R23	5010654	910 KOhms 5% 1/8W
R24	5010077	470 KOhms 5% 1/8W
R25	5010662	7,5 KOhms 5% 1/8W
R26	5010658	5,6 MOhms 10% 1/8W
R27	5010154	8,2 KOhms 5% 1/8W
R28	5010077	470 KOhms 5% 1/8W
R28a	5010077	470 KOhms 5% 1/8W
R29	5010298	2,7 KOhms 5% 1/8W
R30	5010067	560 KOhms 5% 1/8W
R31	5010048	4,7 KOhms 5% 1/8W
R32	5010153	1,2 KOhms 5% 1/8W
R33	5010053	15 KOhms 5% 1/8W
R34	5010060	39 KOhms 5% 1/8W
R35	5010049	100 KOhms 5% 1/8W
R36	5010049	100 KOhms 5% 1/8W
R37	5010049	100 KOhms 5% 1/8W
R38	5010049	100 KOhms 5% 1/8W
R39	5010049	100 KOhms 5% 1/8W
R40	5010049	100 KOhms 5% 1/8W
R41	5010052	6,8 KOhms 5% 1/8W
R42	5010075	33 KOhms 5% 1/8W

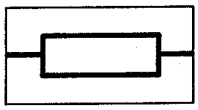


C1	4130107	100 nF 10% 250V
C2	4011025	3,3 nF 10% 100V
C3	4201069	2,2 µF 35V
C4	4201057	1 µF 35V
C5	4201069	2,2 µF 35V
C6	4130107	100 nF 10% 250V
C7	4100059	4,7 nF 2,5% 63V
C8	4200296	2,2 µF 63V
C9	4010060	22 nF —20 +100% 40V
C10	4201058	0,47 µF 35V
C11	4000035	3,3 pF 0,25 pF 63V
C12	4000035	3,3 pF 0,25 pF 63V
C13	4201058	0,47 µF 35V



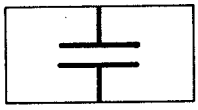
L1	8022065	100 KHz
	7500013	Contact pin

4 PC 8002283 TONE AMPLIFIER-TUNING



R1	5010054	1 MOhms 5% 1/8W
R2	5370061	50 KOhms 20% LIN.
R3	5300092	100 KOhms
R4	5300092	100 KOhms
R5	5300092	100 KOhms
R6	5300092	100 KOhms
R7	5320019	100 KOhms
R8	5370068	25 KOhms 20% LIN.
R9	5010043	1 KOhms 5% 1/8W
R10	5001020	270 Ohms 10% 1/2W
R200	5310061	20 KOhms SPEC.
R201	5010043	1 KOhms 5% 1/8W
R202	5010117	330 KOhms 5% 1/8W
R203	5010120	220 KOhms 5% 1/8W
R204	5010052	6,8 KOhms 5% 1/8W
R205	5010144	680 Ohms 5% 1/8W
R206	5010076	3,3 KOhms 5% 1/8W
R207	5310060	20 KOhms LIN.
R208	5010076	3,3 KOhms 5% 1/8W
R209	5310059	50 KOhms 5% 1/8W
R210	5010144	680 Ohms 5% 1/8W
R211	5010076	3,3 KOhms 5% 1/8W
R212	5010043	1 KOhms 5% 1/8W
R213	5010079	22 KOhms 5% 1/8W
R214	5010048	4,7 KOhms 5% 1/8W
R215	5010120	220 KOhms 5% 1/8W
R216	5010075	33 KOhms 5% 1/8W

R300 - R316 (right channel) =
R200 - R216 (left channel)



C1	4201072	0,22 µF 35V
C2	4130101	100 nF 5% 250V
C3	4200099	100 µF 16V
C200	4200298	1 µF 63V
C201	4010027	1 nF 10% 100V
C202	4200296	2,2 µF 63V
C203	4130097	15 nF 10% 250V
C204	4010027	1 nF 10% 100V
C205	4010027	1 nF 10% 100V
C206	4130101	100 nF 5% 250V
C207	4130101	100 nF 5% 250V
C208	4130097	15 nF 10% 250V
C209	4010027	1 nF 10% 100V
C210	4200296	2,2 µF 63V
C211	4200101	10 µF 16V

C300 - C311 (right channel) =
C200 - C211 (left channel)

	3190061	Pointer P5
	3190072	Pointer P1 - P4
	7210020	Socket 3
	7210096	Socket 8
	7210097	Socket 10
	7400121	Switch, AFC/STEREO/ LOUDNESS
	7402088	Switch, PRESET VOL.

5 PC 8002288 PROGRAM INDICATION

R1	5001033	1,8 KOhms 10% 1/2W
R2	5001004	22 Ohms 10% 1/2W
R3	5001006	33 Ohms 10% 1/2W
IL1 - IL10	8230046	12V 1W
	2510117	Clamp for IL
	7210053	Socket 6
	7210096	Socket 8

6 PC 8002289 VOLUME INDICATOR

R1	5001026	680 Ohms 10% 1/2W
IL1	8230046	12V 1W
IL2	8230046	12V 1W
	2510117	Clamp for IL

7 PC 8002287 TONE/BALANCE INDICATOR

R1	5001010	680 Ohms 10% 1/2W
R2	5001010	680 Ohms 10% 1/2W
R3	5001010	680 Ohms 10% 1/2W
IL1	8230046	12V 1W
IL2	8230046	12V 1W
IL3	8230046	12V 1W
	2510117	Clamp for IL

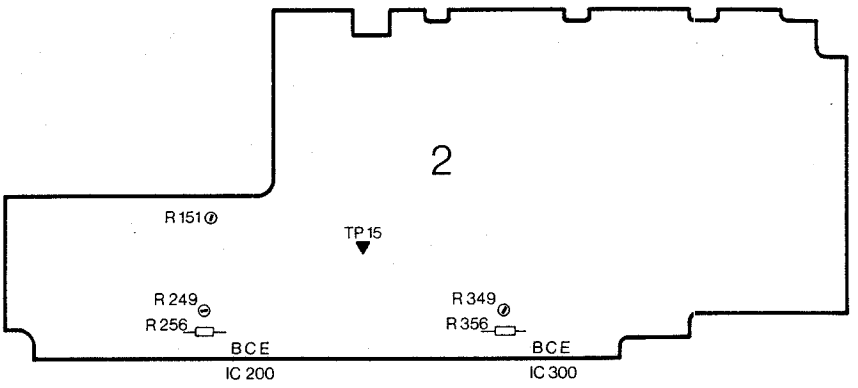
8 PC 8002291 MAINS-VOLTAGE SWITCH

C1	4200109	47 µF 6V
RL1	7600032	14,5V
F1	6600022	1.6A-T/250 IEC 127
F2	6600022	1,6A-T/250 IEC 127
	7500002	Fuse holder
	7400119	Mains-voltage switch
	0593070	Solder lug
	7500014	Socket for pin
	7500013	Contact pin

ADJUSTMENTS

15-VOLT SUPPLY

With the receiver switched to FM, adjust 2R151 so that 15 volts is present at 2TP15.



NO-SIGNAL CURRENT

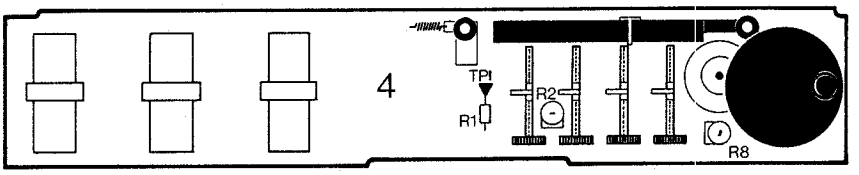
No-signal current is adjusted while the receiver is cold and with the volume control turned down.

Speakers must not be connected.

With 2R249 (2R349) adjust for 25 mA collector current in 2IC200 (2IC300) or - 12 mV across 2R256 (2R356).
When the receiver has been on for ten minutes, with the volume control turned down, check the no-signal current and again adjust for 25 mA or 12 mV across the emitter resistor.

TUNING VOLTAGE

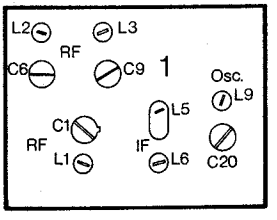
With receiver switched to FM 1 and potentiometer 4R3 turned against the stop at 88 MHz, adjust 4R2 so that 4.5 volts is present at 4TP1.



With receiver switched to FM 5 and potentiometer 4R7 turned against stop at 88 MHz, adjust 4R8 so that 4.6 volts is present at 4TP1.

VHF TUNER

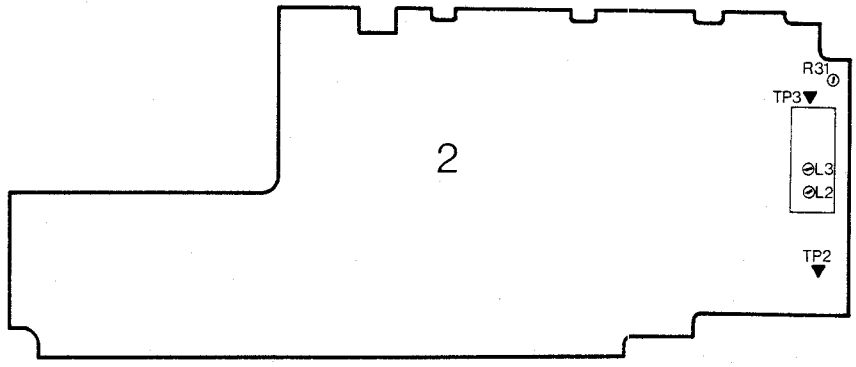
Set tuning control to 89 MHz and sweep generator to 89 MHz.
With 1L1, 1L2, 1L3 and 1L9 adjust for max. IF curve at 2TP2.
Set tuning control to 106 MHz and sweep generator to 106 MHz.
With 1C1, 1C6, 1C9 and 1C20 adjust for max. IF curve at 2TP2.
Check dial accuracy and repeat adjustment if necessary.



Set tuning control to 97 MHz and sweep generator to 97 MHz. With 1L5 and 1L6 adjust for max. IF curve at 2TP2.

DETECTOR

Adjust 2L2 for max. S-curve, measured at 2TP3.
Set tuning control so that so signal is being received and adjust 2L3 so that 0 volts is present at 2TP3.



BALANCE LIGHT

Short 2TP3 to chassis and adjust 2R31 for equal brightness of the two lamps.

DECODER

Short 2TP3 to chassis.
With 2C24 adjust the internal oscillator to exactly 19 kHz as measured at 2TP4.
The accuracy can be checked in two ways:

1 Connect frequency counter to 2TP4.

2 Apply 19 kHz from 2TP4 to y-input of oscilloscope and 19 kHz from a stereo decoder to x-input of the oscilloscope.

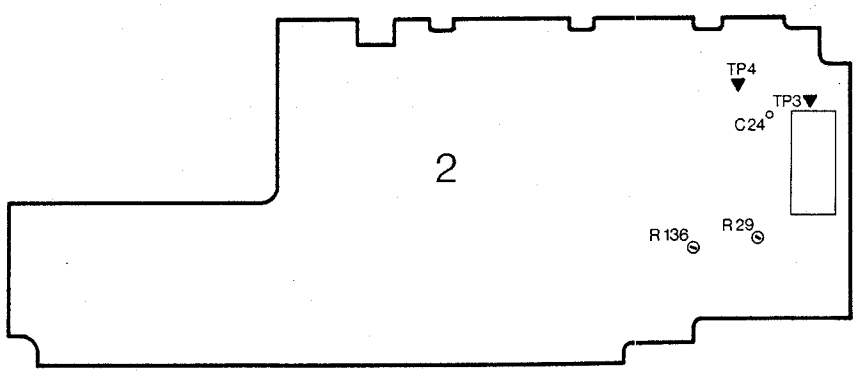
When the Lissajous figure is stationary, adjustment is correct.
A third possible way to adjust the internal oscillator is as follows:

3 Remove short-circuit and tune receiver to a stereo program.
Turn 2C24 to one side until the stereo lamp turns off. Thereafter turn 2C24 to the other side until the stereo lamp turns off.
The setting midway between these two settings represents correct adjustment.

Coil 2L4 is factory pre-adjusted to 114 kHz and should not be touched.

CHANNEL SEPARATION

Connect stereo decoder to aerial input, f mod 1 kHz, Δ f 40 kHz, pilot 8-10%, AFC on.
Connect wattmeter to amplifier output. Treble control at min.
With 2R29 adjust for min. output in the unmodulated channel. Make this adjustment both with unmodulated left channel and unmodulated right channel.

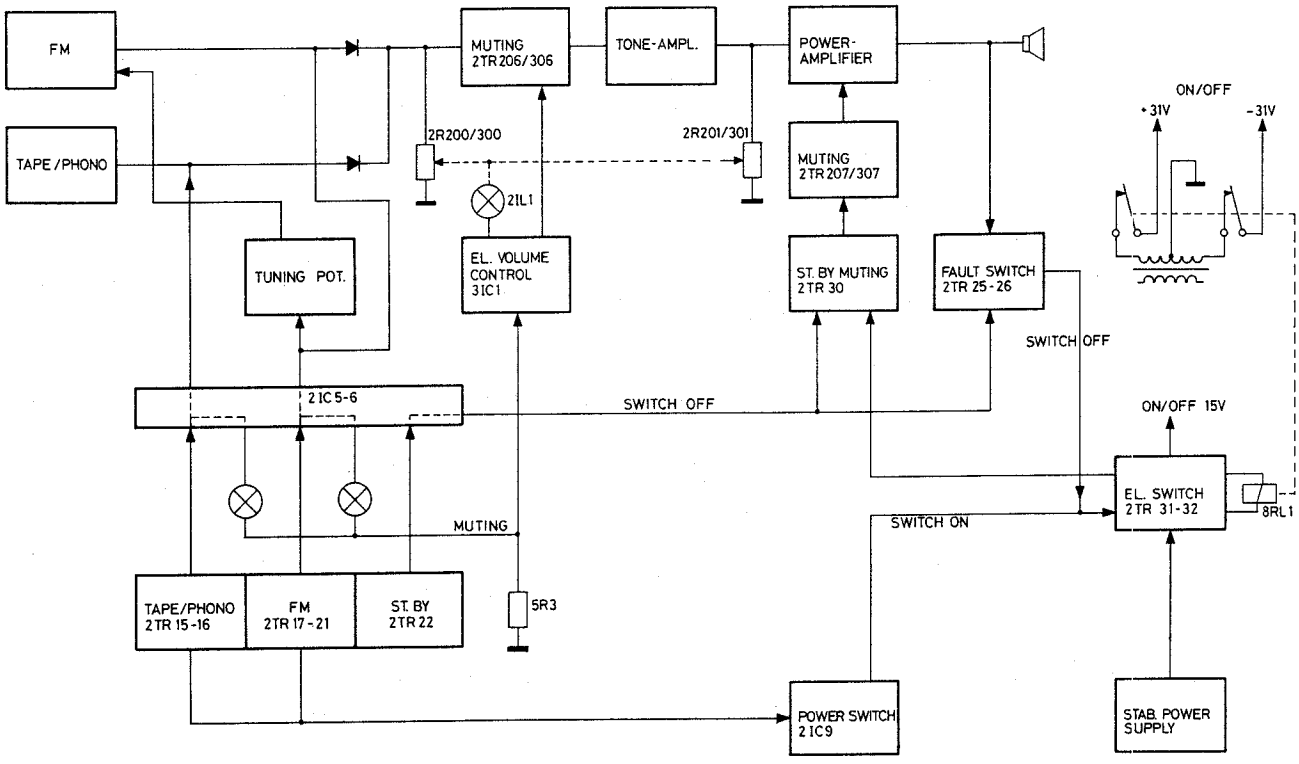


ADJUSTMENT OF LEVEL

Volume set at MEDIUM and receiver switched to TAPE.
Connect tone generator to TAPE input, 200 mV, 1 kHz. Connect millivoltmeter to speaker output. With 2R136 adjust for 100 mV at output.

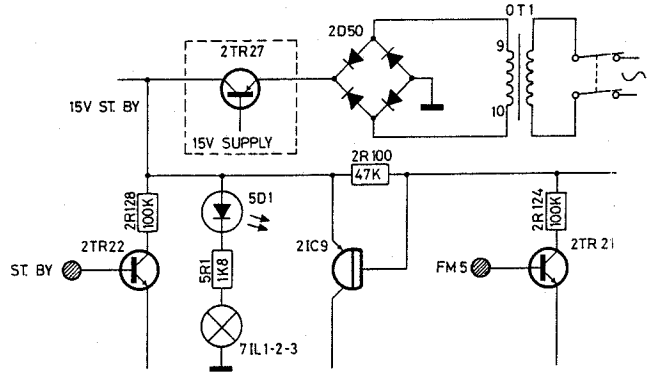
DESCRIPTION BEOMASTER 1900

This description covers the switch functions, muting circuits and counter circuits for volume regulation. The other circuits are considered known and therefore will not be described.



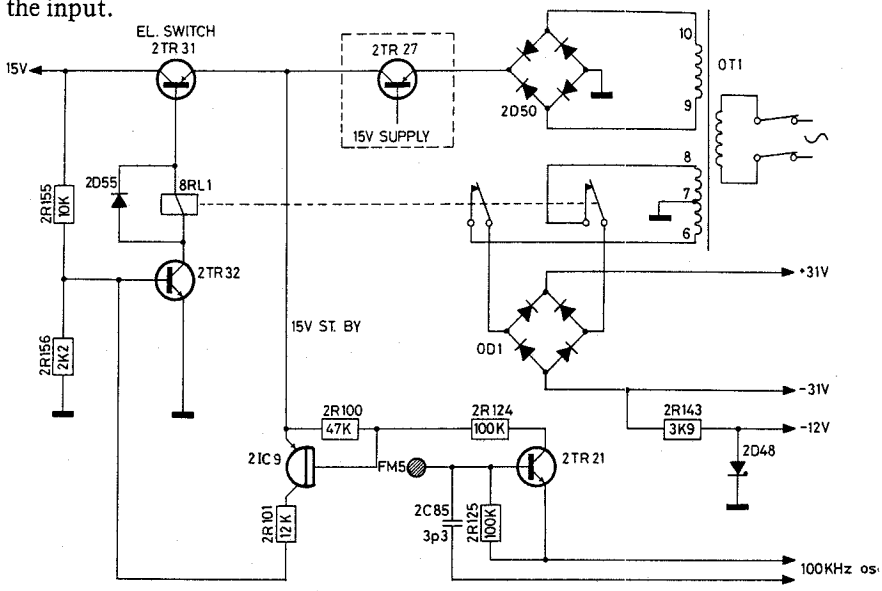
STAND BY

When the on/off switch is operated, 15V stabilised appears at the collector of 2TR27. 15V stand by is brought out to the PROGRAM SELECTION circuit and the anode of 5D1 (stand by indicator), which lights. Return current is fed through 5R1 and dial lights 7IL1-2-3. The set is now ready to receive orders. Orders can be given by touching the control fields.



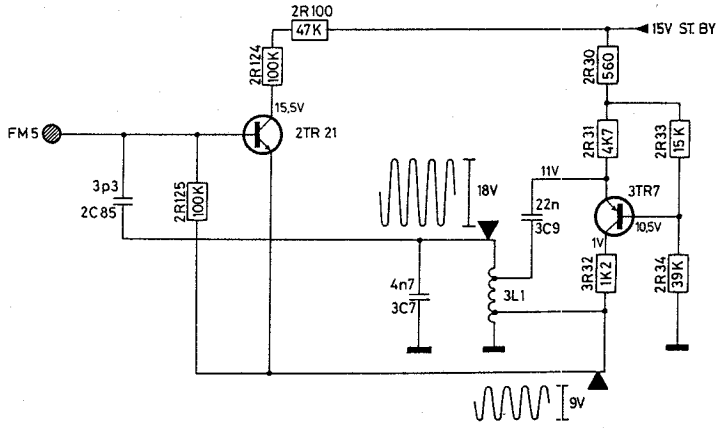
ON

When one of the control fields is touched, the EL. SWITCH, 2TR31 and 2TR32, is activated via 2IC9; also, the relay is energised, applying supply voltage to the rest of the receiver; ± 31V unstabilised is applied to the output amplifier, —12V to EL. VOLUME CONTROL, 27V to FM tuning, and 15V to tuner, IF, decoder, pre-amplifier, tone amplifier, and PROGRAM INDICATION. The stand by indicator turns off when 15V appears at the cathode.
In addition to the application of supply voltage, a pair of switch diodes, 2D200, 2D300, are activated, enabling the signal to pass on to the amplifier.
Furthermore the 15V are applied as supply voltage to 2IC5 and 2IC6 through 2D20. Apart from reducing the voltage, 2D20 prevents noise impulses on the supply rail from cansing the IC to change program. This will happen if the supply voltage briefly becomes higher than the voltage on the input.

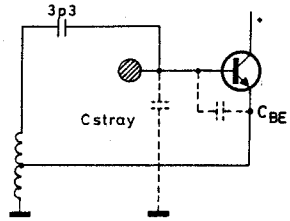


PROGRAM SELECTION

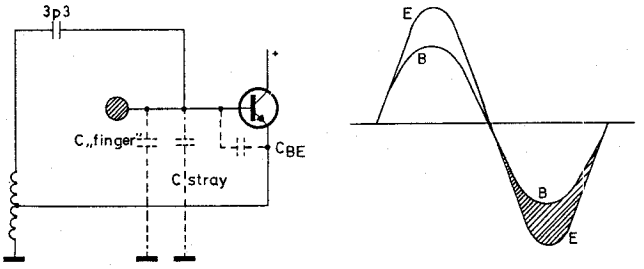
The heart of the circuit is a 100 kHz oscillator, 3TR7, 3L1 and 3C7.
The oscillator coil supplies 100 kHz power to the transistors of the PROGRAM SELECTION circuit, 2TR15 - 2TR22.



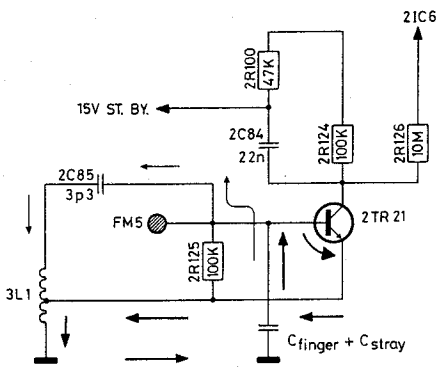
The amplitude of the 100 kHz voltage at the emitter of 2TR21 is approx. 3V rms whilst approx. 6V rms is present at the top of 3L1.
This voltage is fed to the base of 2TR21 through 2C85. The base is connected to the FM 5 control field through a solder terminal and a bronce spring.
The capacitance of 2C85 is 3.3 pF because C spread is 3.3 pF. This provides a division of the 6V voltage so that 3 V will be present at the base just like at the emitter. Hence balance exists between the emitter and base, and the transistor is OFF.



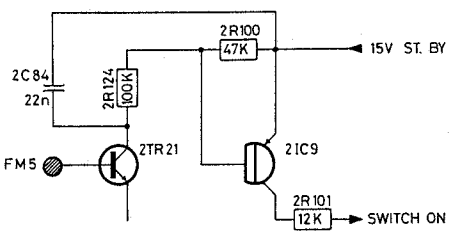
When the control field is touched, a different capacitance to chassis potential will exist (approx. 7 pF). This affects the voltage division ratio so that a lower amplitude is now present at the base than at the emitter, causing the transistor to go ON during the half-cycles in which the base is positive relative to the emitter.



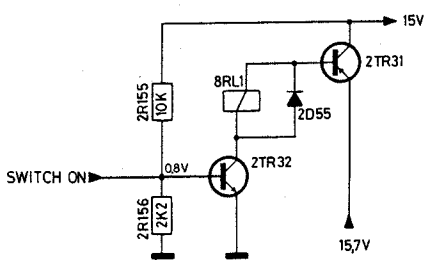
This will result in a flow of pulsating current in the direction of the arrows, and the same amount of collector current will flow in the transistor.
This pulsating current is integrated across 2C84, and a voltage drop occurs at the collector of 2TR21.



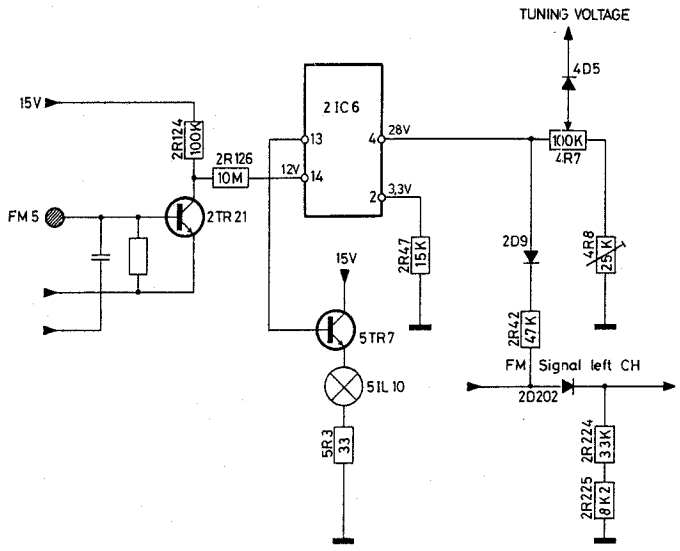
Supply voltage for 2TR21 is obtained through 2R100 and 2R124. When the collector of 2TR21 goes towards chassis potential, the base of 2IC9 will likewise go towards chassis. This will cause the base/emitter voltage to increase, and 2IC9 goes ON.



As long as the control field is touched, a current flows from the collector of 2IC9 to the base of 2TR32. 2TR32 will go ON, drawing its current from the base of 2TR31 through relay coil 8RL1. The relay operates, applying supply voltage, + and -31 V, to the output and -12 V to the volume-control counter circuit. Simultaneously, 2TR31 goes ON and receives 15 V at its collector. This causes 2TR32 to receive constant base bias through voltage divider 2R155 - 2R156; the transistor is ON; and the FM 5 setting is locked. Supply voltage is now applied to the entire receiver. The stand by indicator, 5D1, turns off, 15 V now being present on both sides.



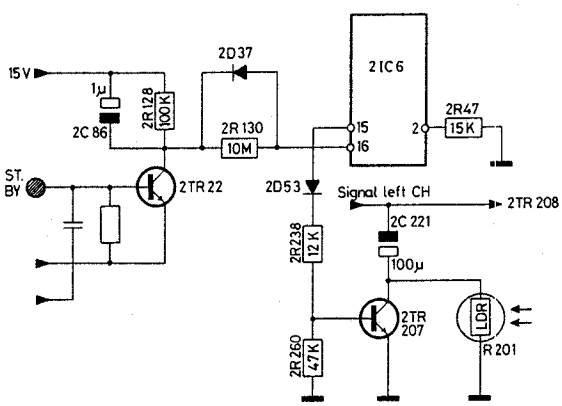
In addition to activating the power supply to the rest of the receiver, the negative voltage jump at 2TR21 is also applied to pin 14 of 2IC6 through 2R126.



When pin 14 of 2IC6 goes towards chassis potential, a positive-going pulse appears at pin 2 across 2R47. This causes the preceding program to be turned off. Simultaneously therewith, a positive voltage appears at pins 13 and 4.
From pin 13, the voltage is fed to 5TR7, which goes ON, and lamp 5IL10 (FM 5) lights.
From pin 4, tuning voltage is fed up to the tuning potentiometer, 4R7. In addition, the voltage at pin 4 is fed through 2D9 and 2R42 to 2D202. The diodes receive forward bias, allowing the FM signal to pass. Simultaneously with this, 2D200 (phono) and 2D201 (tape receive reverse voltage, thereby preventing the passage of any signal on these programs. The same voltage is employed as base bias for 2TR1 and 2IC3.

OFF

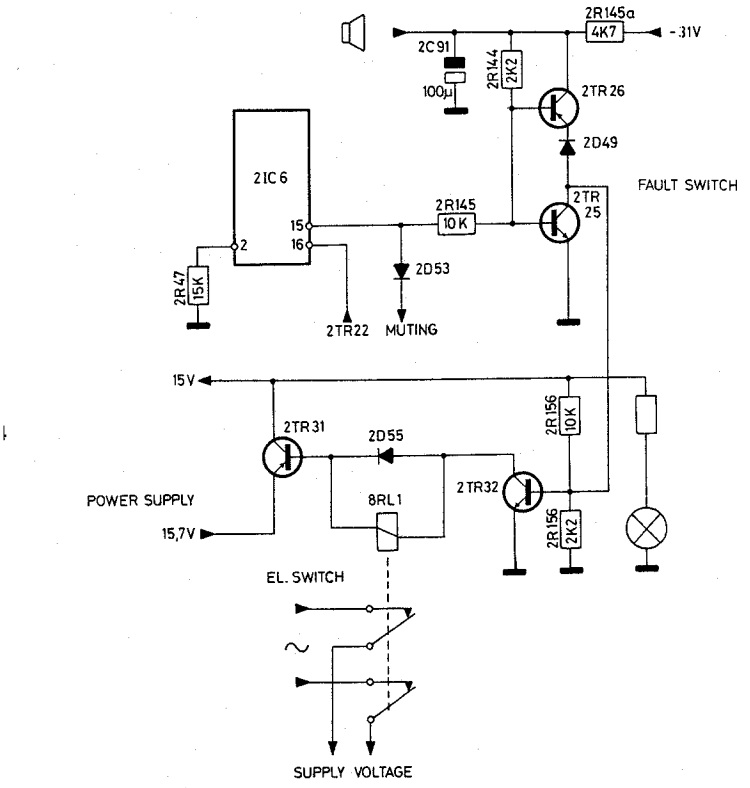
The receiver is turned off by touching the stand by field. The resulting voltage drop at the collector of 2TR22 passed via 2D37 and 2R130 to pin 16 of 2IC6.



At pin 15 there now appears a positive voltage, which is fed to muting transistor 2TR207 through 2D53. The muting transistor goes ON, and the signal is shorted to chassis potential.

2D37 insures during "Switch OFF" that the 2IC6 input pin 16 is held below the supply voltage, as otherwise the positive voltage on output pin 15 would disappear and thus preventing the apparatus from going in "Stand by".

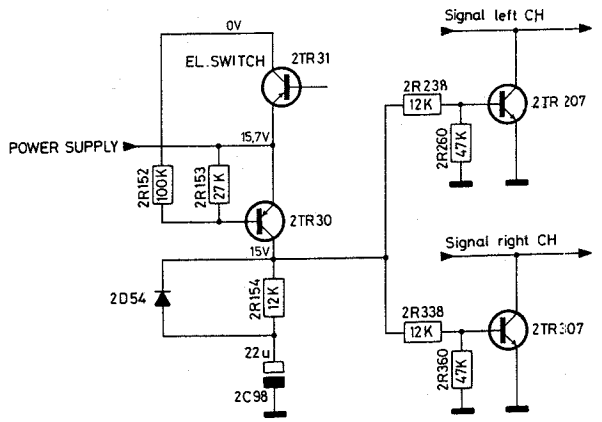
Furthermore, the voltage is fed to the output stage FAULT SWITCH 2TR25 and 2TR26. 2TR25 goes ON, the collector is placed at chassis potential, which potential is transmitted to 2TR32 in EL SWITCH.



2TR32 goes OFF, relay 8RL1 releases, and the supply voltage for the output stages disappears. 2TR31 also goes OFF, and the 15 V supply voltage at the collector disappears. From now on, supply voltage is pressent only at the PROGRAM SELECTION circuit.

MUTING WHILE SWITCHING ON

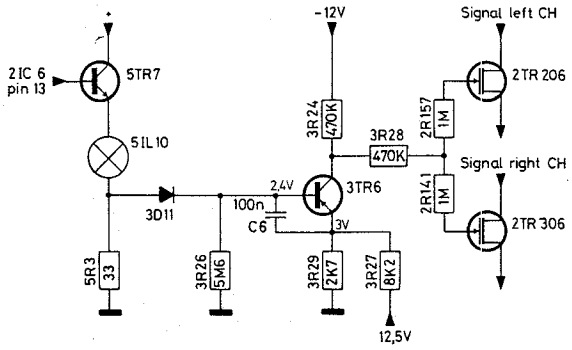
When the set is in stand by, 15 V is present at the collector of 2TR30 and 2C98 carries a charge. The 15 V at the collector keeps the muting transistors, 2TR207 and 2TR307, ON so that any signal is shorted to chassis potential as long as the set is in stand by.



When a program is selected, 2TR30 goes OFF and the 15 V potential disappears from the muting transistors. However, the muting transistors are kept ON until 2C98 is discharged. Discharge occurs through 2D54 and resistors 2R238 and 2R338; the discharge time is determined by these components and is approx. 200 msec.
When stand by is activated, 2TR30 goes ON and 2C98 charges again through 2R154.

MUTING WHILE SWITCHING PROGRAMS

When switching programs there appears across 5R3 a positive voltage jump which is applied to the base of 3TR6. 3TR6 goes OFF, causing -12 V to be present at its collector. The -12 V potential is applied via 2R141 and 2R157 to the muting transistors, 2TR206 and 2TR306, which go OFF, thus blocking the signal path.



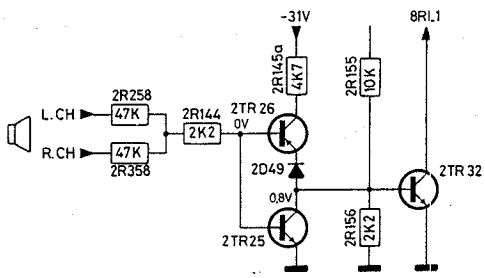
This remains blocked until 3C6 is discharged, which lasts approx. 500 msec. 3D11 secures that 3C6 will not discharge through 5R3 but only through 3R26.

MUTING WHILE SWITCHING OFF

When the set is switched off, the positive pulse appearing at pin 15 of 2IC6 is fed to muting transistors 2TR207 and 2TR307, causing them to go ON. Simultaneously therewith the 15 V supply voltage disappears, and 2TR30 goes ON. The 15 V potential at the collector of 2TR30 thereafter provides base bias for 2TR207 and 2TR307 and keeps them ON as long as the set is in stand by.

FAULT SWITCH

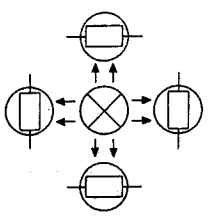
In the event of faults in the output, the circuit, 2TR25 and 2TR26, will cut off the supply voltage, and the set will go into stand by. If a positive DC voltage appears at the output, in either the left or right channel, 2TR25 will go ON, and the collector will be at chassis potential. This will cause 2TR32 to go OFF; the relay releases and the supply voltages disappear.



If the DC voltage appearing at the output is a negative one, 2TR26 will go ON. The emitter receives a negative voltage as a result of which 2TR32 goes OFF, the relay releases and the supply voltages disappear.
2D49 ensures that 2 TR26 will not go ON without reason.

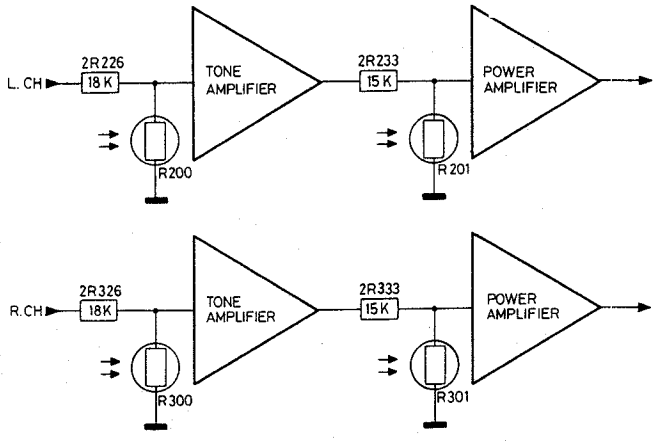
VOLUME CONTROL WITH PHOTORESISTORS

Volume control by means of sensitouch requires either a motor-driven potentiometer or some form of electronic control.
The system selected for the Beomaster 1900 is electronic control by means of photoresistors, so-called LDR's (light-dependent resistors). The photoresistors, four in all, are physically grouped around the same lamp, which thus controls in both left and right channels.



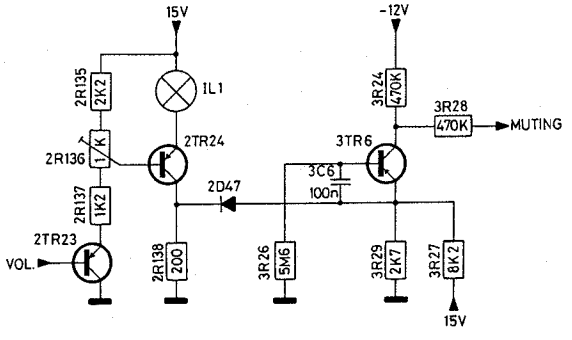
When under strong light the resistors have a value of a few hundred ohms. Decreasing light intensity causes an increase in resistance, reaching several megohms in darkness.

Circuitwise, the resistors are connected as shown:



The mode of operation is as follows:
Looking at the left channel:

If the photoresistors receive no light, their resistance is very high, and the signal passing through 2R226 continues unobstructed to the tone amplifier and from there through 2R233 to the output amplifier.
This situation corresponds to full-on volume.
If the photoresistors are thereafter illuminated their resistance will be lower, and only part of the signal from 2R226 will go into the tone amplifier because of the voltage division taking place between the photoresistor 2R200 and 2R226. The same condition exists in the output amplifier.
The lamp is powered from an adjustable lamp driver circuit.

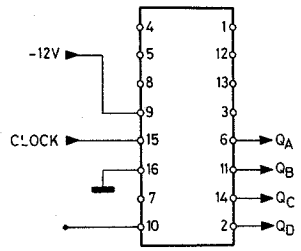


At max. volume, approx. 1 V is present across the lamp; at min. volume, approx. 5 V.
The resulting control range is 70-75 dB.

A defective lamp will correspond to max. volume. To prevent this, the collector of 2TR24 is connected to 3TR6 via 2D47.
If the lamp filament breaks, the collector voltage of 2TR24 will disappear. The emitter of 3TR6 goes towards zero via 2D47, causing 3TR6 to go OFF. At the collector there now appears -12 V, which is fed to the muting transistors, 2TR206 and 2TR306, which go OFF, and the receiver is muted.

Volume regulation is carried out by altering the base bias of 2TR23. This means that we need a circuit that is capable of altering this voltage upwards or downwards as long as we touch the volume control and thereafter locking the voltage until we again want a volume change.

For this purpose we employ a binary counter circuit, MC 14516, which can count in both directions.
It is an integrated circuit. We are not going to discuss what it contains. We just want to study its properties.

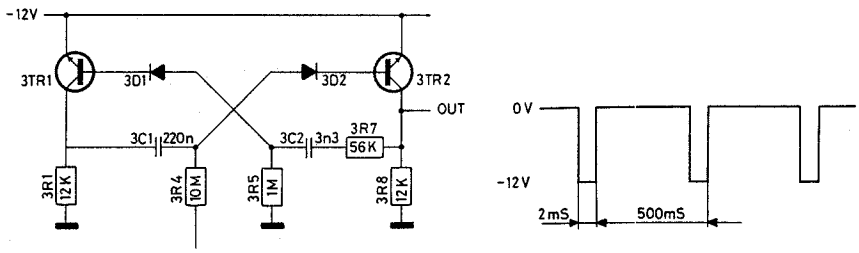


The sketch shows the counter IC. It is connected between chassis potential and —12V. There are four outputs, Q_A - Q_B - Q_C - Q_D. These outputs can assume only two voltage values, either -12 V or 0 V. In digital parlance an output is said to be low when it has assumed its most negative value, and high when it has assumed its most positive value. Alternatively, these two states are called 0 and 1, respectively, which is what we will do below. Therefore: a zero represents -12 V and a figure one represents 0V.
Since it is therefore possible for each for output to have two positions we shall have a total of
2 x 2 x 2 x 2 = 16 combinations.
In system form it looks like this:

	Q_D	Q_C	Q_B	Q_A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1

This set-up is called the binary code. Q_A is called the least significant digit, and Q_D is called the most significant digit.
The counter is designed so that it will itself run through these combinations when ordered to do so. It does this by feeding a series of pulses from a clock generator to pin 15.
The clock generator is a multivibrator whose pulses have the appearance shown in the sketch below.

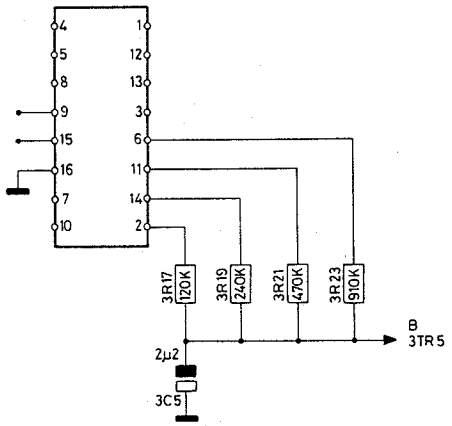
When +12 V is applied to 3R3 or 3R4, the multivibrator starts.
If -12 V is fed to 3R3 or 3R4, the multivibrator blocks.



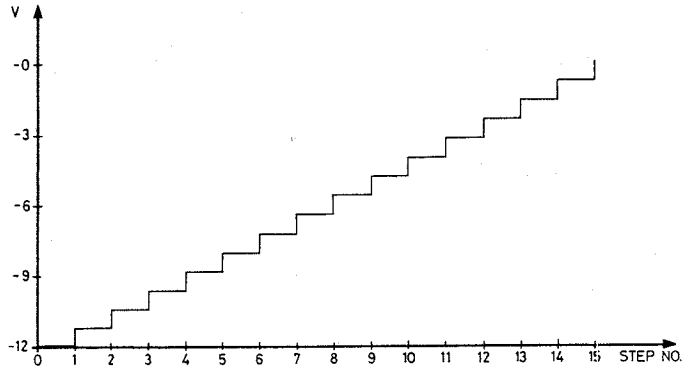
The counter switches from one combination to the next every time the clock voltage jumps from -12 V to 0 V.
If pin 10 of the IC is connected to chassis potential the IC will count in the direction from 0 to 15. If, on the other hand, pin 10 is connected to -12 V the counter will count in the direction 15, 14, 13, ... 0.
On reaching one of its extreme positions, the counter turns round; that is, it starts all over again. For example, 12 - 13 - 14 - 15 - 0 - 1 - 2 etc.
Of course this won't do when it is to operate the volume control. For this reason a stop circuit is provided which blocks the multivibrator when one of the extreme positions is reached.

DIGITAL/ANALOG CONVERTER

By means of four resistors we alter the voltages at Q_A, Q_B, Q_C, and Q_D to a voltage analogous with the number at which the counter happens to be at the particular moment.



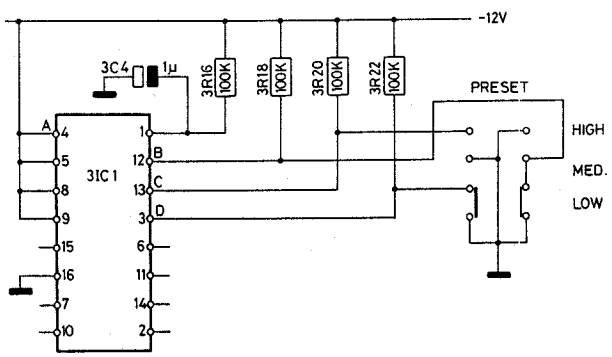
Each output connects through a resistor to a common junction. The resistance values have been chosen so that the most significant digit Q_D has the lowest resistance connected to it. the most important but one has a resistance that is twice as high, etc.
It is easily seen that the voltage at the junction will be 0V in one extreme position and —12V in the other extreme position. For all other positions the voltage will assume some value between —12V and 0V.
The change will take place in jumps so a graphical representation would have the appearance of a staircase.
However, we smooth down the staircase with 3C5 so that the volume variation will not take place in audible jumps.



VOLUME CONTROL PRESET

In addition to having four outputs, the IC also has four inputs, A, B, C, and D, which may be used for programming the IC. We are going to make use of this because we want the receiver to set itself to a preset volume when started up.
The A input we fixed at —12V. That is, 0 in digital parlance.
B, C, and D have also been fixed at —12V, but through a 100 kohm resistor each of them. Furthermore, B, C, and D are connected to a preset switch.
The switch allows us to set the input in the following combinations:

H 0110
M 1000
L 1010



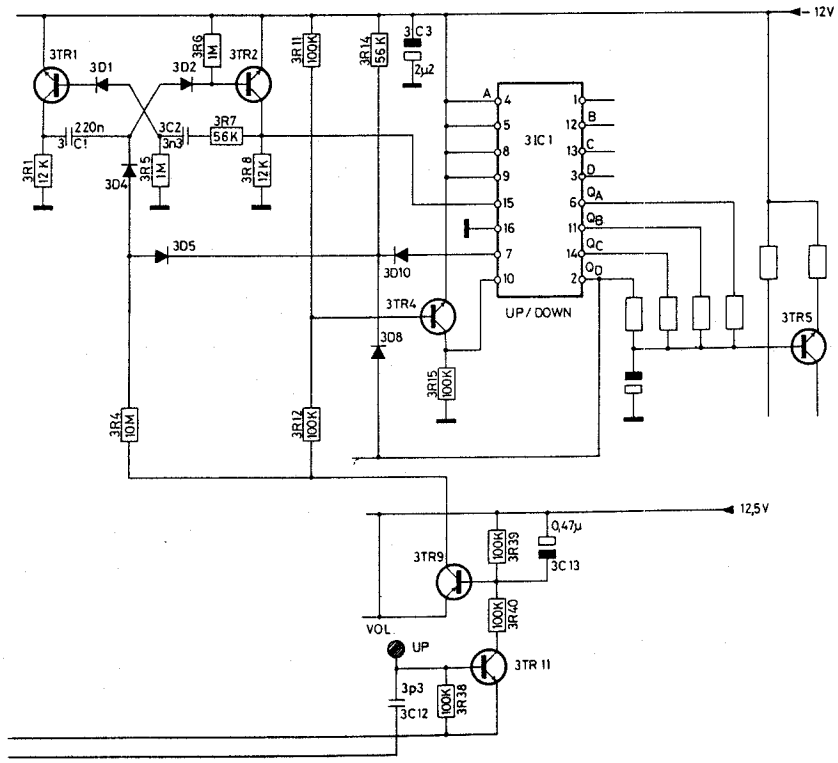
The combination selected will automatically be transmitted to the outputs when we start the receiver. The fact is that the outputs will set themselves to be equal to the inputs if the voltage at pin 1 has the digital value of 1, which it has during start, as pin 1 is connected to chassis potential through a 1µF capacitor, 3C4.
A fraction of a second after start, pin 1 has dropped to 0 on account of 3R16, and the IC is ready to count.

UPWARD REGULATION OF VOLUME END STOP:

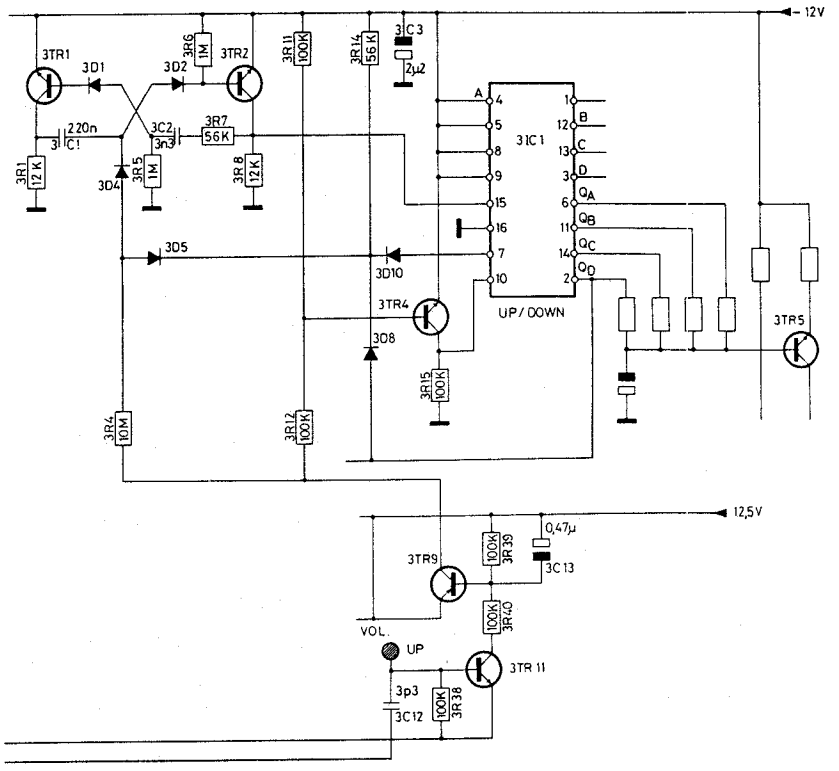
The IC carries a marking as to whether it is in one of the extreme positions. This marking is the voltage at pin 7.
Normally, pin 7 is 1, but when we reach one extreme position (max. volume), where the outputs are 0000, pin 7 is also 0.
In the other extreme position (min. volume), where the outputs are 1111, pin 7 is also 0.
In all other positions, pin 7 is 1.
The pin 7 output may now be added to the combination table as shown:

Counter position	Pin 7	Q_D	Q_C	Q_B	Q_A
0	0	0	0	0	0
1	1	0	0	0	1
2	1	0	0	1	0
3	1	0	0	1	1
.	.	.	.	.	.
.	.	.	.	.	.
12	1	1	1	0	0
13	1	1	1	0	1
14	1	1	1	1	0
15	0	1	1	1	1

It will be seen that in the 0 position, pin 7 and Q_D have the combination 00.
In the 15 position, the combination is 01.
In other words: the combination of pin 7 and Q_D tells us whether we are in an extreme position, and also which one.
We make use of this fact for stopping the multivibrator when we reach one of the extreme positions.



When we touch the "Up" field, 3TR11 and 3TR9 draw current.
Some of the current flows through 3R12 to the base of 3TR4, causing 3TR4 to go ON and so connect pin 10 to —12V. This means that the counter has been told to count downwards, giving louder volume, when and if the multivibrator starts up.
From 3TR9, a current flows through 3R4 to the junction of 3D4 and 3D5.

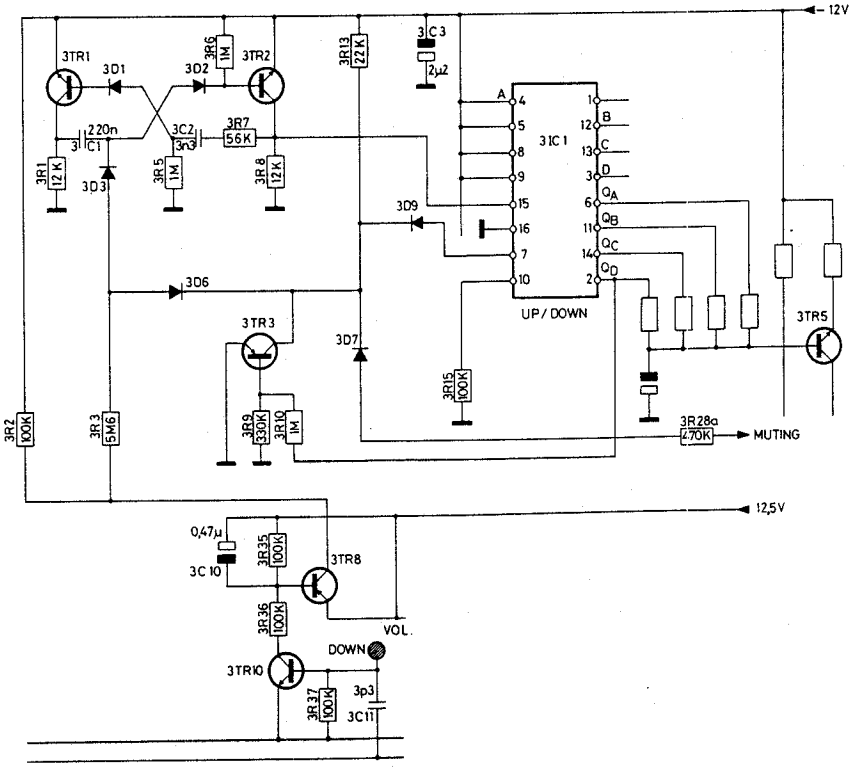


Which way will the current flow now? Well, that depends on whether the voltage on the other side of 3D5 is high or low.
If the voltage is low, the current will flow through 3D5 and 3R14 to —12V, and the multivibrator will not start up.
If, on the other hand, the voltage is high, 3D5 is cut off, and the current will flow into the multivribrator and start it up.
In order for the multivibrator to run, therefore, the voltage at the junction of 3D5, 3D8 and 3D10 must be high. When is it high? it is high if: Q_D is 1, pin 7 is 1 or both Q_D and pin 7 are 1. The voltage is low if both Q_D and pin 7 are 0, and it is low only in the 0 position. Accordingly, the multivibrator can run until the 0 position is reached; then it stops.

DOWNWARD REGULATION OF VOLUME

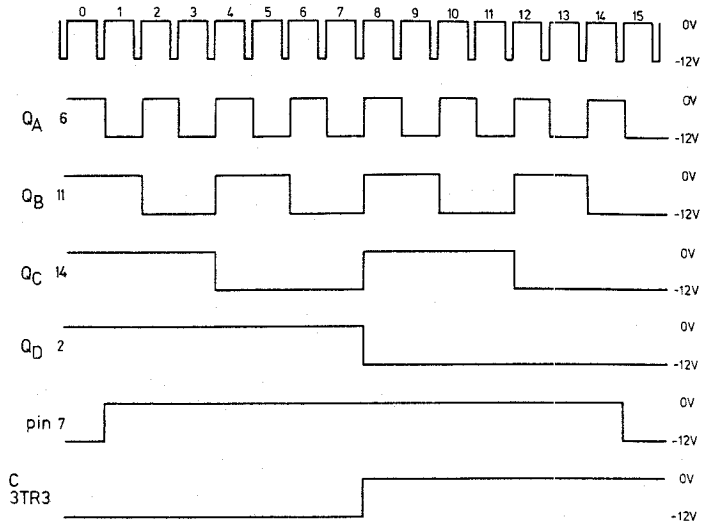
END STOP

This function is somewhat similar to the one just described.



Pin 10 of the IC is connected to chassis potential through 3R15; that is, pin 10 is 1: this means that the counter is now ready to count upwards, giving lower volume.

If we touch the "Down" field, 3TR10 and 3TR8 will draw current, which will start the multivibrator if the voltage at the junction of 3D6, 3D9 and the collector of 3TR3 is high, and it will be high if:
the collector of 3TR3 is 1, or pin 7 is 1, or both are 1.



TIMING DIAGRAM

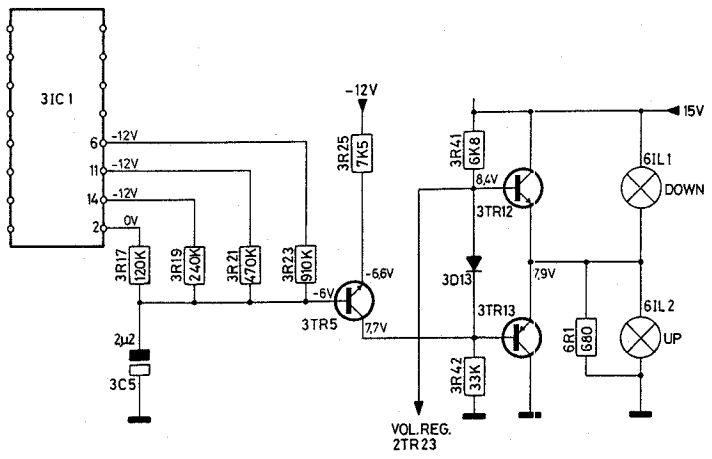
For 3TR3 it applies that the collector is 1 when Q_D is 0 and vice versa.
To stop the multivibrator, pin 7 must be 0 and Q_D1; that is, the combination 01. This is obtained in the 15 position, so the multivibrator stops here.

MUTING

In the 15 position, or min. volume, the voltage at the junction of 3D6, 3D9 and 3D7 is low, which fact is utilised for muting the receiver.
The —12V potential is fed via 3D7 to the muting transistors, 2TR206 and 2TR306, which go OFF and in so doing block the signal.

VOLUME INDICATION

When volume is regulated upwards the voltage at the base of 3TR5 goes towards —12V. The collector voltage goes in the positive direction. This voltage change is transmitted to the base of 3TR13 and via 3D13 to the lamp driver circuit, Which makes the voltage across 2IL1 drop and in so doing makes the volume increase.
The voltage change at the base of 3TR13 is also employed for lamps 6IL1 and 6IL2.

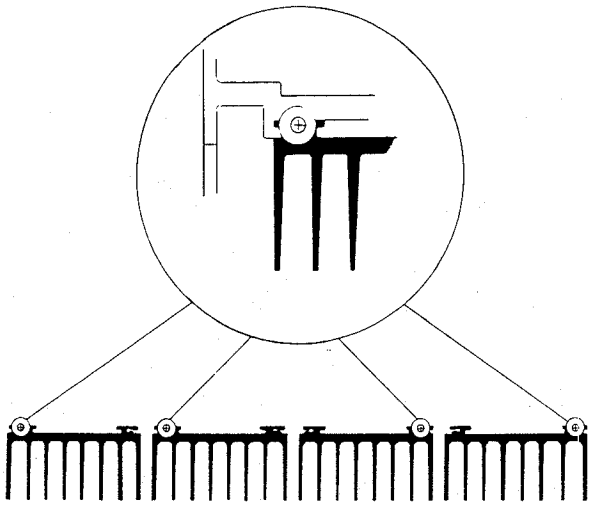


The voltages are measured in the MEDIUM position, and volume is regulated from the MEDIUM position upwards.
When the voltage at the base of 3TR13 becomes more positive, the base/emitter voltage drops, and 3TR13 is OFF.
The voltage at the base of 3TR12 becomes more positive too as a result of which 3TR12 will draw more current and 6IL2 become brighter.
If volume is regulated from the MEDIUM position downwards, the voltage at the base of 3TR13 will move in the negative direction. This will make 3TR13 go ON and 6IL1 become brighter.

Bang & Olufsen

MODIFICATIONS

FASTENING OF HEAT SINKS



The heat sinks are fastened to the chassis by means of screws and washers.
Screw No. 2013024
Washer No. 2622261
The change has been introduced from No. 189001.

CHANGE OF TUNING VOLTAGE

From apparatus No. 248001 2D19 has been changed to No. 8340105 which is the same type of diode, but with a larger voltage, 27.5V - 29.5V. This means that the tuning voltage must be adjusted to a larger voltage:

FM1, 4R2 to be adjusted to 4.7V
FM5, 4R8 to be adjusted to 4.8V.

SERVICE TIPS

SENSITIVITY ON THE OPERATING FIELDS

The oscillator coil, 3L1, has in production been adjusted to 3.2 Volts measured in 3TP2 with voltmeter (Ri ≧ 1 Mohm).
If the sensitivity on the operating fields is too low, the voltage in 3TP2 may be increased to max. 3.5 Volts.